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OFFICE OF EXPERIMENT STATIONS—BULLETIN NO. 168.

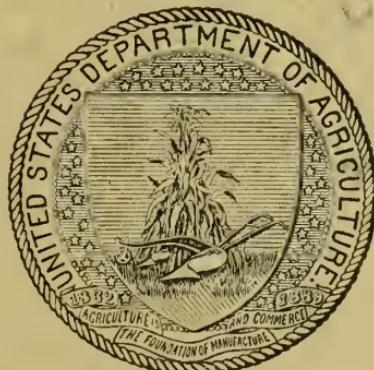
A. C. TRUE, Director.

THE STATE ENGINEER AND HIS RELATION TO IRRIGATION.

BY

R. P. TEELE,

EXPERT IN IRRIGATION INSTITUTIONS.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1906.

LIST OF PUBLICATIONS OF THE OFFICE OF EXPERIMENT STATIONS ON IRRIGATION AND DRAINAGE.

NOTE.—Publications marked with an asterisk (*) are not available for distribution.

- *Bul. 36. Notes on Irrigation in Connecticut and New Jersey. By C. S. Phelps and E. B. Voorhees. Pp. 64.
- *Bul. 58. Water Rights on the Missouri River and its Tributaries. By Elwood Mead. Pp. 80.
- Bul. 60. Abstract of Laws for Acquiring Titles to Water from the Missouri River and its Tributaries, with the Legal Forms in Use. Compiled by Elwood Mead. Pp. 77.
- Bul. 70. Water-Right Problems of Bear River. By Clarence T. Johnston and Joseph A. Breckens. Pp. 40.
- *Bul. 73. Irrigation in the Rocky Mountain States. By J. C. Ulrich. Pp. 64.
- *Bul. 81. The Use of Water in Irrigation in Wyoming. By B. C. Buffum. Pp. 56.
- *Bul. 86. The Use of Water in Irrigation. Report of investigations made in 1899, under the supervision of Elwood Mead, expert in charge, and C. T. Johnston, assistant. Pp. 253.
- *Bul. 87. Irrigation in New Jersey. By Edward B. Voorhees. Pp. 40.
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- Bul. 92. The Reservoir System of the Cache la Poudre Valley. By E. S. Nettleton. Pp. 48.
- Bul. 96. Irrigation Laws of the Northwest Territories of Canada and Wyoming, with Discussions by J. S. Dennis, Fred Bond, and J. M. Wilson. Pp. 90.
- Bul. 100. Report of Irrigation Investigations in California, under the direction of Elwood Mead, assisted by William E. Smythe, Marsden Manson, J. M. Wilson, Charles D. Marx, Frank Soulé, C. E. Grunsky, Edward M. Boggs, and James D. Schuyler. Pp. 411.
- Bul. 104. The Use of Water in Irrigation. Report of investigations made in 1900, under the supervision of Elwood Mead, expert in charge, and C. T. Johnston, assistant. Pp. 334. (Separates only.)
- *Bul. 105. Irrigation in the United States. Testimony of Elwood Mead, irrigation expert in charge, before the United States Industrial Commission, June 11 and 12, 1901. Pp. 47.
- *Bul. 108. Irrigation Practice Among Fruit Growers on the Pacific Coast. By E. J. Wickson. Pp. 54.
- Bul. 113. Irrigation of Rice in the United States. By Frank Bond and George H. Keeney. Pp. 77.
- Bul. 118. Irrigation from Big Thompson River. By John E. Field. Pp. 75.
- Bul. 119. Report of Irrigation Investigations for 1901, under the direction of Elwood Mead, chief. Pp. 401. (Separates only.)
- Bul. 124. Report of Irrigation Investigations in Utah, under the direction of Elwood Mead, chief, assisted by R. P. Teele, A. P. Stover, A. F. Doremus, J. D. Stannard, Frank Adams, and G. L. Swendsen. Pp. 336.
- Bul. 130. Egyptian Irrigation. By Clarence T. Johnston. Pp. 100.
- Bul. 131. Plans of structures in use on irrigation canals in the United States, from drawings exhibited by the Office of Experiment Stations at Paris, in 1900, and at Buffalo, in 1901, prepared under the direction of Elwood Mead, chief. Pp. 51.
- Bul. 133. Report of Irrigation Investigations for 1902, under the direction of Elwood Mead, chief. Pp. 266.
- Bul. 134. Storage of Water on Cache la Poudre and Big Thompson Rivers. By C. E. Tait. Pp. 100.

[Continued on third page of cover.]

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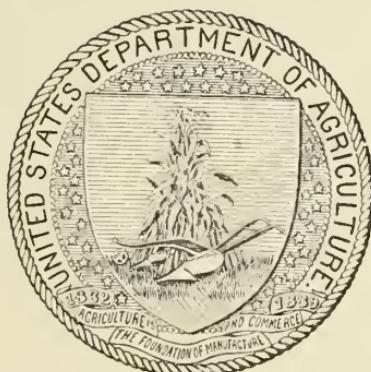
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., April 25, 1906.

SIR: I have the honor to transmit herewith a report on the State Engineer and his Relation to Irrigation, prepared by R. P. Teele, and to recommend its publication as a bulletin of this Office.

Respectfully,

A. C. TRUE,
Director.

Hon. JAMES WILSON,
Secretary of Agriculture.

(3)

CONTENTS.

	Page.
Introduction.....	7
California.....	8
Colorado.....	8
Defining rights.....	8
Acquirement of rights.....	10
Distribution of water.....	11
Division engineers.....	16
The State engineer.....	17
Records of the State engineer's office.....	18
Wyoming.....	19
Defining territorial rights.....	20
Acquirement of rights.....	24
Distribution of water.....	31
Miscellaneous duties of the State engineer.....	34
Appointment, qualifieations, and pay of officials.....	36
Records of offices of State engineer and board of control.....	37
Fees.....	39
Nebraska.....	40
Defining rights.....	40
Acquirement of rights.....	44
Distribution of water.....	46
Miscellaneous duties of secretary of board.....	47
Reecords of the State board of irrigation.....	48
Fees.....	49
Appointment, terms, and salaries of officials.....	49
Idaho.....	49
Defining rights.....	50
Acquirement of rights.....	53
Distribution of water.....	57
Cost of administration.....	59
Miscellaneous duties of the engineer.....	60
Records of the engineer's office.....	61
Utah.....	62
Defining rights.....	63
Aequirement of rights.....	67
Distribution of water.....	71
Miscellaneous.....	71
Fees.....	72
Records of engineer's office.....	73
Nevada.....	73
Defining rights.....	73
Aequirement of rights.....	75
Distribution of water.....	76
Miscellaneous.....	77

	Page.
Montana.....	78
Defining rights.....	79
Acquirement of rights.....	79
Distribution of water.....	79
North Dakota.....	80
Defining rights.....	81
Acquirement of rights.....	82
Distribution of water.....	83
Fees.....	83
Oregon.....	84
Defining rights.....	84
Acquirement of rights.....	86
South Dakota.....	86
Defining rights.....	87
Acquirement of rights.....	87
Distribution of water.....	88
Miscellaneous.....	89
Fees.....	90
Oklahoma.....	90
New Mexico.....	90
General discussion.....	91
Tabular summary.....	98

ILLUSTRATION.

	Page.
FIG. 1. Sample map for applicants for water rights in Wyoming.....	25

THE STATE ENGINEER AND HIS RELATION TO IRRIGATION.

INTRODUCTION.

The office of State engineer is peculiar to the arid States, and the duties of the office have to do chiefly with irrigation. These duties range from merely making hydrographic surveys, as in Oregon, to practically complete control of the water supply, as in Nevada. It is true, however, that in most of the arid States whatever there is of public control of the use of water centers in the office of State engineer. A comparative study of the work of the engineers involves, therefore, the whole subject of public control of water.

The final purpose of the creation of the office of State engineer is the delivery of the water to which he is entitled to each farmer whose farm is under irrigation, and a necessary preliminary to this is a knowledge of how much each is entitled to. The early laws governing irrigation were not such as to provide a record of rights, and it is therefore necessary to provide means for defining existing rights. This in some States has been committed to the engineer, in others he makes surveys to assist the courts in this work, while in others he has nothing to do with it. To avoid future trouble, it is also necessary that hereafter rights be defined as they are acquired, and several States have provided that rights be acquired under the supervision of the engineer, while others still have no provision for supervising the acquirement of rights, but leave the defining of the rights to be done when controversy regarding them arises. The final act—the distribution of the water of streams to those entitled to it—is in some States all that devolves upon the engineer, while in some States the engineer has not this duty, but has a part in the proper defining of rights.

It is the purpose of this report to describe the methods used in the different States for accomplishing the three acts—defining existing rights, supervising the acquirement of new rights, and distributing water—and in exercising whatever additional control over irrigation exists, in the hope that this comparative study may bring out the strong and weak points in the different systems and help toward the adoption of the best methods in all the States.

In this report the States which have now or have had engineers are taken up in the order in which the office was created.

CALIFORNIA.

California was the first State to create the office of State engineer. A long series of discussions and proposals for different systems of public control of irrigation in California, which included National control and construction, State control and construction, and various other schemes, culminated in 1878 in the passage of a law creating the office of State engineer for the purpose of collecting information as to water resources and irrigable lands. The purpose of the law was "the acquirement of data upon which the State might formulate a policy and frame legislation respecting irrigation matters."^a The office was continued for ten years, during which time there was much criticism on account of the lack of results, and in 1887 the legislature made an appropriation for salary and expenses for one year, with the proviso that this should be in full for the completion of all work then in the hands of the State engineer. Two large reports were issued, one on irrigation in Italy, Spain, and France, and one on San Diego, San Bernardino, and Los Angeles counties, Cal. Since the abolition of the office there has been more or less agitation for its revival, but in general the people of California seem to be quite indifferent on this matter.

Rights are acquired without public supervision and are defined only in case of controversy, and water is divided without any public supervision, the only remedy when one's rights are infringed being a suit to define rights if they have not been defined, and a proceeding for contempt of court if any party is taking water which has been allotted to another by the court.

COLORADO.

The office of State engineer was created in 1881, the engineer being given general charge of the distribution of water throughout the State. The same law provided for the defining of existing rights by the courts, and for filing claims for new rights with the county clerks and the State engineer, the idea being that this filing of claims would provide a record of new rights. The provision for filing claims was, however, declared void on account of a defect in the title of the act. In this plan the engineer is considered a purely administrative officer, and his duties, so far as they relate to irrigation, were confined to general supervision of distributing water after rights have been defined.

DEFINING RIGHTS.

Rights are defined by the courts in a special form of procedure prescribed by the statute. As a preliminary to this adjudication all parties claiming any interest in any ditch, canal, or reservoir were required to file statements of their claims with the county clerks

^a Wm. Ham. Hall's Rpt., Pt. 1, p. 12.

before June 1, 1881. Since that date any party interested in any ditch, canal, or reservoir may apply for an adjudication of the rights to the source from which the water is taken. Upon the receipt of such application the court proceeds to an adjudication, usually appointing a referee to take testimony and formulate a decree defining the rights. The decree is based on the testimony presented by the claimants, as a rule, but in some cases the courts have employed engineers to measure the capacities of the ditches. Notices of the hearings are given by publication and by personal service on all parties having claims on file. Each party may call such witnesses as he chooses, but must pay their fees.

After hearing all testimony or on receiving the report of the referee, if one has been appointed, the court enters a decree "determining and establishing the several priorities of right, by appropriation of water, of the several ditches, canals, and reservoirs in such district, concerning which testimony shall have been offered, each according to the time of its construction and enlargement or enlargements or extensions, with the amount of water which shall be held to have been appropriated by such construction and enlargements or extensions, describing such amount by cubic feet per second of time, if the evidence shall show sufficient data to ascertain such cubic feet, and if not, by width, depth, and grade, and such other description as will most certainly and conveniently show the amount of water intended as the capacity of such ditch, canal, or reservoir in such decree."

The clerk of the court issues to the claimant a certificate of his rights as defined by the court, upon the payment of a reasonable fee, and these certificates are recorded by the county recorder upon payment of the customary fees. Appeal may be taken to the supreme court of the State at any time within four years, or any party may ask for a rehearing in the district court at any time within two years; but after four years from the entering of a decree "all parties whose interests are thereby affected shall be deemed and held to have acquiesced in the same, except in case of suits before then brought, and thereafter all persons shall be forever barred from setting up any claim to priority of rights to water for irrigation in such water district adverse or contrary to the effect of such decree."

Any party acquiring a right after the rights in any district have been decreed may have his rights defined by applying to the court which entered the original decree, the procedure being the same as for an original adjudication.

Most of the rights in Colorado have been defined under this special form of procedure, but there is continuously arising litigation to settle points which had not arisen at the time the decrees were rendered.

ACQUIREMENT OF RIGHTS.

In 1903 the law requiring filings by those building new works was reenacted, and since that time every party constructing or enlarging any ditch or reservoir is required to file with the State engineer a statement of his claim, with duplicate maps of the proposed works. The maps must be filed within sixty days of the commencement of construction, which may be the date of actual construction or the beginning of the survey. The duplicate is examined and certified to by the State engineer and is returned to the applicant, so that it may be filed with the county clerk within ninety days of the date of the beginning of construction. Maps must be on a good quality of tracing cloth, 24 by 36 inches, with a 2-inch margin on the left-hand side, making the available space for the map 24 by 34 inches. All maps are made of this size, irrespective of the size of the works, and must not be folded. In the case of reservoirs the scale must be 1 inch or more to 400 feet, and if necessary more than one sheet must be used. The map filed with a notice must show the location of the head gate, the route of the ditch, or the high-water line of the reservoir, and routes of the feeders and outlets from the reservoir, the legal subdivisions of land on which the works are located, and the names of the owners. Upon or attached to the map must be a statement showing the location of the head gate; the depth, width, grade, and length of each ditch, canal, or feeder proposed; the carrying capacity of each ditch in cubic feet per second; the time of commencement of work, and the estimated cost of the proposed project. For a reservoir the statement shows the height of the proposed dam, the estimated cost, the capacity in cubic feet, and the surface area for each foot in depth of water stored, up to and including the high-water mark.

The engineer is required to certify that he has examined and approved the map and statement "if he shall find the data therein contained to be sufficient and satisfactory for a clear presentation of the facts concerning the claims made."

As to the effect of the law requiring these filings: Up to September, 1905, 1,280 claims had been filed. There are about 1,000 filings made under the earlier law, which was declared void. Claims are at present coming in at the rate of about three per day. The legal effect of filing a claim is declared by the statute as follows:

A certified copy of the map and statement thus filed in the State engineer's office shall be *prima facie* evidence in any court having jurisdiction of the intent of the claimant or claimants to make such construction, and to utilize such rights as are shown and described in the map and statement: *Provided*, That nothing herein contained shall be so construed as to dispense with the necessity for due diligence in the construction of such projects, or to the injury of those having rights prior to those of the claimants. (Laws of 1903, p. 291.)

This law makes the engineer a mere recording officer so far as the acquirement of rights is concerned. There is no inspection of works by the engineer to ascertain what is done under the claims, and no provision for filing of statements regarding th's by the claimant.

The requiring of such filings may be regarded, however, as a step toward a better system which will provide for an inspection and measurement of the completed works and the submission of proof as to dates of beginning and finishing construction. Such proof, taken as soon as the works are done, when dates and capacities can be easily ascertained and made a matter of public record, will be of great service in providing a table of rights to all streams. But the application of the water appropriated to a beneficial use is necessary to the acquirement of a right, and there should be provision for the taking and recording of proof as to the use of water, as well as the construction of works.

DISTRIBUTION OF WATER.

Colorado was the pioneer State in providing for the distribution of water by public officials, the engineer being the head of the system. The State is divided into five divisions, the boundaries of which are determined by drainage lines, so drawn that each division is independent of all others, as no water flows from one to another. Each division is divided into districts, each of which includes a tributary or a section of a stream, the idea being to make the districts of the sizes which will make the distribution of the water easiest. For each district there is a commissioner, who has direct charge of regulating the head gates of the ditches in such a way that the water will be justly distributed among those having rights to its use. For each division there is a division engineer, who has supervision of the water commissioners of the districts within his division, while the State engineer has supervision over the entire matter of distributing water. In the distribution of water the commissioner is governed by the decrees of the court defining rights, being required to close the gates of all canals whose rights have not been defined, at any time when there is not water enough for all. In order that the commissioner may know how much water he has with which to supply these decreed rights, the State engineer is required to make gaugings of streams, while ditch owners are required to put in measuring devices in order that the commissioner may know how much water he turns into each ditch. This outline makes it look as if distributing water was a comparatively simple matter, but in practice it is not so.

Many of the decrees are indefinite, making it necessary for the commissioners to interpret them. Most of them have awarded to some of the ditches more water than has ever been diverted by them, while in theory the owners of a ditch are entitled to no more water than they

have put to beneficial use. Under these circumstances there is always a tendency for the holders of decreed rights to more water than they have ever used to enlarge their demand on the stream by enlarging or extending their ditches or by selling the surplus to some one else. In such a case the usual thing is for the canal owner to attempt to take the increased quantity of water claimed, when the commissioner must decide whether or not he will allow it. The commissioners have usually been inclined to enforce the theory of beneficial use and refuse to allow the increased use, even if the volume decreed was in excess of the volume used. Appeals are then made to the courts, which have a tendency to uphold the decrees, regardless of beneficial use. But in any case when such a demand comes the commissioner must first decide what he will do. Since 1899, before a transfer can be made the party wishing to transfer any right to another ditch must apply to the court for permission to do so, but parties still try to secure transfers through the commissioner. The law regarding transfers, just referred to, relates to permanent transfers only, but ditch owners may still "loan" or exchange water for short periods to save crops. There is a tendency in some sections to "loan" water which is not needed by the loaner, and to which he therefore has no right; and here, again, the commissioner must decide whether the proposed loan comes within the terms of the law.

Further complicating the matter of determining how the water supply shall be divided, the commissioner is required to see that no one taking water is allowing it "to go to waste or to be wastefully or extravagantly or wrongfully used * * * or put to any other use than that to which it is entitled to be used in the order of priority," and to shut off the supply to the extent that the water is being wasted or wrongfully used.

Any one dissatisfied with any action of the commissioner may appeal to the division engineer, and from him to the State engineer, but the usual practice has been to disregard the orders of the commissioner and then apply to the court for an injunction to restrain him from enforcing them.

The physical difficulties are equally great. Not all the streams have been measured enough times to make it possible to make rating tables which would enable the commissioner to find out each day how much water there is to divide. But the streams which have been measured vary constantly in discharge, making necessary frequent changing of the head gates of the ditches. Very few canals had accurate measuring devices, and the commissioner was authorized to put them in if the owners refused to do so and collect the cost from the owners. There was no penalty for not putting them in, and the commissioner was forced to bring suit to collect in case the owner of the

ditch refused to pay. The result has been that a great many canals were without measuring devices.

In 1891 the water officials were empowered to shut off the water from any ditch in which proper head gates and measuring devices were not placed after ten days' notice. This has been quite effective, and measuring devices are now quite generally in the canals. The State engineer is required to rate the measuring flumes if they are put in, but has never had funds with which to do this. The practice has been for the engineer or a deputy to rate ditches whenever the owners would pay the expenses, but not otherwise. At present the fees paid to the State engineer for examining and approving ditch and reservoir filings and furnishing copies of the records of his office go to make up a gauging fund to be used for stream and canal gauging, but this is still too small to cover the work which should be done.

A single water district may cover 50 miles of the course of a stream and the ditches among which the water is to be divided are scattered along this distance. In this distance there are losses and gains in the flow, due to seepage from the bed of the stream and evaporation on the one hand and return seepage on the other hand. This makes it necessary for the commissioner to have an intimate knowledge of his stream, in addition to a record of the supply entering his district. The water-right holder is entitled to have a certain quantity of water at his head gate, not at the head of the stream. If the ditch is at the lower end of the district it may be necessary to let twice as much as he is entitled to go by later ditches above in order to supply him, or return seepage may supply the whole volume and render it unnecessary to turn any water down from above. The commissioner must learn by experience the behavior of his stream in order to divide its water properly. In the more highly developed districts there are measuring stations in the streams supplying the water, where daily or more frequent readings are made, and most of the ditches have measuring devices. The irrigation practice has become sufficiently settled to enable the commissioner to know how much he must turn down the stream to give each ditch its proper share of the water, and the demand for water is so great that there is little danger of wasteful use. The commissioner of such a district receives each morning by telephone a statement of the stage of the river, then goes over the stream, regulating the head gates of the ditches as may be necessary to make a proper division or telephones the ditch managers, telling them how much water to take, going over the district often enough to assure himself that his orders are being carried out.

Changing a head gate which has been set by a water commissioner is punishable with a fine not exceeding \$300 or sixty days' imprisonment or both such fine and imprisonment; and the fact that the

water is being used under a ditch from which it was shut out by the commissioner is *prima facie* evidence against the owners of the ditch for changing the head gates. The commissioners and their deputies are given the power to make arrests. Very little is done under this, however. The commissioners find that in many cases the district attorneys will not prosecute, or if they do they make little effort to convict. Juries will seldom convict for this offense. The early reports of the commissioners, published in the reports of the State engineer, are largely made up of statements of their troubles with parties who refused to obey their orders and threatened bodily harm to them in case they attempted to perform their duties. However, the sentiment against the unlawful taking of water and in favor of the punishment of those who do so seems to be growing.

The commissioners are charged also with the duty of collecting and reporting statistics regarding irrigation in their districts. They are to report the carrying capacity of each ditch and the quantity of water carried by it each day of the season, the area under each ditch and the number of acres watered, the kinds and acreages of crops under each ditch, and the amount of water stored in each reservoir. Blanks for keeping these records are supplied by the State engineer. These include blanks for a daily record of the water carried by each canal, which are to be turned in monthly and which contain columns headed: (1) Day of the month; (2) Day of the week; (3) Hour, a. m.; (4) Gauge height; (5) Quantity; (6) Hour, p. m.; (7) Height; (8) Quantity; (9) Average for day; and (10) Remarks. The last column is to contain notes of the times when gates are changed, the changes made, and what crops are being watered. There are also weekly reports to the division engineer, showing the quantity of water received by the district from different sources, the quantity of water used and the quantity flowing out of the district, the crops receiving water, the time during which water will be required, the quantity necessary to supply all needs, the date of the latest rights which are being supplied, the condition of the weather, and crop conditions.

In addition to this there is a "Water commissioner's field book," in which he keeps the record for the whole season. This contains blanks for both reservoirs and ditches. The ditch blanks contain for each ditch columns for the dates and quantities of water carried, and a summary showing the first day water was used, the last day water was used, the number of days water was carried, the average daily amount carried, the length of laterals, the number of acres that can be irrigated, and the acreages of the following crops irrigated and matured: Alfalfa, natural grass, cereals, orchard, market garden, potatoes, sugar beets, and other crops. Statements of costs of repairs, maintenance, and improvements are also included. The reservoir blanks contain columns for the dates when water was delivered, the

quantity delivered, and the name of the ditch to which it was delivered, with a summary showing the amount stored prior to May 1 and the amount stored during the whole season.

The commissioners are instructed to keep two of these books, one of which is carried in the field, so that notes may be kept as the observations are made. The other is to be filled out at the end of the season and sent to the State engineer to be kept as a part of the records of his office.

These records have never been kept up by the commissioners, the reason usually assigned being that the county commissioners, who must allow the bills of the water commissioners, have refused to pay for the time necessary for the collection of the data required. The commissioners have been repeatedly urged to collect the information while about their other duties, but have not generally done so. They complain also that farmers and ditch owners will not give them the information, seeming to think that it may in some way be used to their disadvantage.

Charges against a commissioner must be made in writing to the division engineer, who is required to hold a fair and impartial trial, after five days' notice to the commissioner. If the commissioner is found guilty, the division engineer is to appoint a deputy to do the work of the commissioner. Within thirty days the engineer must file with the governor his findings, and if he recommends dismissal the governor is to appoint a new commissioner recommended by the county commissioners. The complainant must put up a bond to reimburse the commissioner in case the charges are not sustained. This is a recent law, and no cases have arisen under it.

The commissioners have been sued in the courts for damages and have always claimed that the State should defend them, but the attorney-general has refused to do this. One commissioner gives an instance where suit was brought against him, but later dismissed on motion of the complainant after the commissioner had gone to considerable expense to prepare a defense. It would seem that the State should defend the commissioner in such cases and reimburse any necessary expense.

The pay of water commissioner is \$5 per day for the time actually put in. He is not to begin work in any season until called upon by some water-right holder who is not getting the water he deems himself entitled to or until ordered out by the division engineer, and is not to continue working longer than the necessity therefor exists. In the more highly developed districts along the South Platte and Arkansas rivers the commissioners put in full time, as the winter flow of the streams is used either for storage or for winter irrigation. In some other districts the commissioners work but a few days and in wet seasons not at all. The expense of distribution in 1904 in district No. 2,

which includes the South Platte from Denver to the mouth of the Cache la Poudre, was for pay of commissioner, \$1,800; pay of two deputies, \$1,350—a total of \$3,150. The acreage irrigated is estimated at 77,470 acres, making the expense about 4 cents per acre. While the division engineer is paid by the State, his salary and expenses should be charged to distribution of water. His salary is \$1,500 per annum, and his expenses are limited by law to \$500 per annum. There are approximately 900,000 acres in division No. 1, in which district No. 2 is located, making the cost per acre but 0.2 cent, and the total expense but 4.2 cents per acre.

The water commissioners and their deputies are paid by the counties into which the districts extend, the expenses for any district being divided equally among the counties included, regardless of the acreage irrigated in any county or the amount of work done. There is some objection to this by the counties where there is little irrigation which are in districts with other counties having large irrigated areas, and there seems to be just ground for this complaint. The law provides that the expense be paid "pro rata" by the counties, which would give some ground for claiming that the original intention was that the expense should be divided some other way than equally.

DIVISION ENGINEERS.

The office of division superintendent was created in 1887, and in 1903 it was abolished by the creation of the office of division engineer, the duties being practically the same. When the administrative system was adopted in 1879, the State was divided into districts, and provision was made for adjudicating rights in these districts independently, and commissioners were appointed to distribute water within these districts. While the whole system of water rights in Colorado is based on priority, this administrative system made no provision for recognizing priorities except within districts, although there were on some streams several districts. The creation of the office of division superintendent was a recognition of the fact that priorities should be recognized between all appropriators from the same source of supply, as well as between those within a single district. It was made the duty of the clerks of the district courts to send to the superintendents copies of all decrees regarding water rights, and from these each superintendent made a table of rights for each district within his division and a general table for his whole division. As often as required the water commissioners report to the superintendent "what ditches, canals, or reservoirs are at that time without their proper supply." "If it shall appear that in any district in that division any ditch, canal, or reservoir is receiving water whose priority postdates that of the ditch, canal, or reservoir (not receiving water) in another district as ascertained from his register, he shall at once order such postdated

ditch, canal, or reservoir shut down and the water given to the elder ditch, canal, or reservoir." These orders are issued to the water commissioners, who have no discretion in the matter but to obey them. However, there is reported one case where a commissioner refused to obey such an order, and the superintendent reported to the State engineer that it would take the whole State militia to enforce his order, and therefore he thought best not to undertake its enforcement.

The division engineers have general supervision of the water commissioners in their districts, may order them on duty before they are called out by the water users, and may perform the duties of the commissioners if occasion requires. They collect data concerning reservoirs, reservoir sites, and flow of streams and perform such other duties as are assigned by the State engineer.

Complaints against the actions of the water commissioners are made to the division engineers and complaints against his actions to the State engineer. Appeals from division engineers' rulings may likewise be taken to the State engineer. The procedure for trial of charges against an engineer is the same as for trial of a commissioner, except that trial is held by the State engineer instead of the division engineer.

The division engineers and the State engineer hold a meeting in November of each year, when the reports of the division engineers are presented, and a general discussion of irrigation matters in the State is held.

Division engineers are appointed from the divisions in which they are to serve, from list of eligibles secured by examinations given by the State engineer. The examinations include questions as to measurements of streams, laws and customs relating to irrigation and water rights in Colorado, and the experience of the applicant. The appointments are made by the governor for terms of two years. The salary is \$125 per month for the time actually put in and expenses necessarily incurred not to exceed \$500 per annum for each engineer. The engineers usually put in full time, making the salary \$1,500 per annum. There are five division engineers, making the total possible expense to the State for their salaries and expenses \$10,000 per year.

THE STATE ENGINEER.

The State engineer is the nominal head of the administrative system of the State, but, in fact, he has less to do with distributing water than either the division engineers or the water commissioners. The commissioners actually distribute the water and the division engineers make rules and issue orders to the commissioners regarding the distribution, but the State engineer has no jurisdiction except as matters come up to him on appeal from the rulings of the division engineers or for review after the division engineers have passed on them.

All measuring devices are under the control of the engineer at all times, and he has had made standard designs for flumes. These are not rated, however, except upon application of the owners and at their expense. Efforts to reduce this expense are made by endeavoring to get all parties in a section to put flumes in at the same time, so that the expenses of the man making the measurements may be divided among a number of parties. A small charge is made for rating ditches, the fees going into a rating fund which is used in gauging streams.

The engineer has supervision of all reservoirs. Plans for all dams over 10 feet high must be approved by the engineer before construction begins, and he is to act as consulting engineer and require material and work to be satisfactory to him, the owner to pay expenses and \$5 per day. He is to determine annually how much each reservoir in the State may store, examine dams to determine their safety whenever complaint is made by anyone living below them, and determine how much shall be deducted for losses of water by seepage and evaporation when stored water is discharged into the natural streams to be diverted below. With the exception of the filing and approval of plans and the examination of dams complained of, the law regarding reservoirs is not generally enforced because of lack of funds. There are hundreds of reservoirs in Colorado, and an annual inspection to determine how much can be safely stored would require a large outlay. The determination of the amounts to be deducted from stored water turned into streams for losses in transit is probably the most urgent of these duties which have been neglected for lack of funds, as this is a matter which produces constant friction between the owners of reservoirs and others taking water from the streams used as carriers of stored water. It would seem that the expense of making measurements for this purpose might very properly be made a charge against the parties owning the reservoir.

The engineer is required to make estimates of the amount of snowfall in the mountains during the winter as a basis for estimating the water supply for the following summer. This is done by correspondence with parties living in the mountains and by sending a deputy into the mountains whenever practicable. In addition to his duties connected with irrigation, the engineer has charge of all internal improvements, such as the building of State roads and bridges.

RECORDS OF THE STATE ENGINEER'S OFFICE.

In the engineer's office all ditch and reservoir filings are numbered consecutively and filed by the water district in which the site of the proposed works is located. These are then card indexed under three headings—the name of the ditch or reservoir, the name of the stream, and the name of the claimant.

Copies of all court decrees are filed in the engineer's office and are card indexed under the name of the ditch or reservoir.

All maps filed under the present law are of uniform size, 24 by 36 inches, and are filed in books of that size and bound.

The following fees are collected by the Colorado engineer:

For examination, filing, and certification to the duplicate of each map and statement of claim, and of each judicial decree ordering the transfer of a water right, \$1; each certificate other than that made in the case of an original filing, \$1; for examination and filing of each set of plans and specifications for reservoir, dam, or other structure for utilizing or storing water, \$1 for each \$5,000 of estimated cost; copies of plats, \$1 per hour for time spent in making; copies of records, 10 cents per folio.

All filing fees from April 8 to September 15, 1905, amounted to \$520.

WYOMING.

The office of Territorial engineer was created in Wyoming in 1886. Prior to that there was provision for water commissioners who were to distribute water, but no other provision for any public control of water. The Territorial engineer was given general supervision of the diversion and division of water and supervision of the work of the water commissioners. He was also to make measurements and calculations of stream flow and collect facts as to systems of reservoirs. The clerks of courts were instructed to send copies of all decrees to the engineer, who prepared from them instructions to the water commissioners.

The present system was created when Wyoming was admitted as a State, in 1890, the outlines being embodied in the constitution and the details supplied by the first legislature. The system as adopted at that time and still in existence, with only minor changes, contained two radical departures from existing practice in this country. These were the adjudication of rights by an administrative body, and the acquirement of rights through application to a public official, who had power to refuse it under certain circumstances rather than by taking the water and posting and filing a claim as notice to others of the existence of the right. These provisions were founded on a principle new to American irrigation law. The State was declared to be the owner of the water and rights to its use were to be acquired by grant or license from the State, while under the old system the water was considered as belonging to the public, and the State exercised only such supervision as was necessary to preserve the peace. This new interpretation has been denied by the supreme court of the State, although it has upheld the laws as a proper exercise of the police power of the State (*Farm Investment Company v. Carpenter*, 61 Pac., 258; *Willey v. Decker*, 73 Pac., 210), but the principle in mind when the laws were enacted was undoubtedly that the State was proprietor of the water and granted rights to its use.

The new code adopted on the admission of the State provided for the adjudication of all existing rights, the acquirement of rights in the future, and the distribution of water to those entitled to its use.

DEFINING TERRITORIAL RIGHTS.

The defining of rights acquired prior to the creation of the new system was placed in the hands of the board of control, which was composed of the State engineer as president and the superintendents of the four water divisions into which the State was divided. The State engineer makes measurements of the stream, the rights to which are to be adjudicated; determines the carrying capacities of the canals; makes examination and approximate measurement of the lands irrigated or susceptible of irrigation from the ditches, and makes a map showing the course of the stream, the location of each ditch or canal, and the legal subdivisions of land which have been irrigated or are susceptible of irrigation from ditches already constructed. The superintendent of the division in which the stream is located takes testimony as to dates of original construction and subsequent enlargements, dimensions of ditches, and areas irrigated at various dates.

Notice of the adjudication consists in the publication by the board in a newspaper in general circulation in the county when the adjudication is to take place, of a notice stating when the surveys will begin, and when and where the taking of testimony will begin. The superintendent also notifies each party having a claim on record, by registered mail, of the time for both making surveys and taking testimony, and incloses a blank form for statement of claim. Each claimant is required to certify to his statement, under oath, and the superintendent administers the oath without a charge. When the testimony is all in it is opened to inspection by all interested parties, at a time and place specified by the superintendent in a notice published for one week in a newspaper published in the county. At this time contests may be filed by interested parties, and heard by the superintendent. The testimony is transmitted to the board of control, and at its next regular meeting an order defining the rights is made. Appeal from this decision may be taken to the district court. It was provided that cases pending in the courts when this law took effect might be turned over to the board, and this was done in a few cases.

The board organized in April, 1891. At that time the courts had defined the rights on only six streams, settling less than 200 claims, while there were on record and awaiting adjudication more than 3,000 claims. The demand for adjudication was so great that in some cases testimony was taken before the surveys were completed, but this did not prove satisfactory, as the maps make possible the informal correction of many errors in description while taking testimony. For the first few years the making of these surveys was the principal work of

the engineer's office. The superintendent takes this map with him when taking testimony, and is in this way able to assist claimants in making out their statements correctly. The map is submitted to claimants and acknowledgment of its correctness secured from them, making it a part of their testimony. Even with this precaution many mistakes were made in describing lands, and these mistakes often were carried through into the final certificates, necessitating the correction of these when the mistakes came to light later. To avoid this, it has been found necessary to go further and locate each tract under the ditches surveyed and mapped. In 1904 the system of making surveys was changed somewhat. A plane table of special design was adopted and the superintendent assists in making the surveys. Each irrigated tract is shown on the map, and the superintendent takes the testimony as the survey progresses. In this way there is little opportunity for mistake in land descriptions, since misstatements will be caught at once and corrected before the survey proceeds. There has been another change in practice in the interests of accuracy. Originally the superintendent received testimony at stated places, but the new system takes him among the people, reducing the chance of errors.

Each claimant is now required to pay to the superintendent at the time of submitting his testimony \$1.75—the fees to the State engineer for issuing a certificate and to the county clerk for recording it. Before this law was passed many owners did not call for their certificates, avoiding the payment of the fees and rendering the county records incomplete. The payment of the fees in advance corrects this practice.

After completing the taking of testimony the superintendent gives published and written notice of the time and place where it will be open to inspection.

When the testimony is opened to inspection any interested party may contest any claims made. Most of the parties inspect the statements of others, and there is considerable informal correcting and getting together on points of difference without regular contests. The law originally provided that the contestant might fix the time and place for the hearing on his contest, but this did not work well. Parties wishing to block the adjudication would file contests and then fail to set a date for hearing them, thus tying up the whole proceeding. Now the superintendent sets the time. He serves upon each interested party a written notice of this hearing, either by mail or in person, and secures from them a waiver of any other service.

After hearing all contests the superintendent transmits to the board of control all statements of claim and all testimony taken in hearing contests. Before the meeting of the board at which this is passed upon the superintendent tabulates the results, and if there have been no contests the board usually instructs its secretary to issue certificates

in accordance with the tabulation. If there are contests, the board goes more into the testimony before rendering its decision.

Any one dissatisfied with an order of the board may appeal to the courts or may, within one year, apply for a rehearing before the board. The large number of errors in land descriptions has been mentioned. Originally there was no provision for rehearing, and there was no method of correcting manifest errors after they had once been passed by the board of control. The provision for rehearing was largely for the purpose of correcting these errors. The board now has express authority to "permit, upon good cause shown, the correction of the testimony of any party or witness if it shall appear that a mistake has occurred therein." (Rev. Stat. 1899, sec. 884.) There has been a number of rehearsings, especially on Green River and tributaries, in the adjudication of which many mistakes were made. There has also been a number of appeals, yet very few considering the large number of rights defined. Speaking of appeals taken in 1892, when five appeals were taken from 327 certificates issued, the State engineer said:

These appeals were occasioned, in almost every instance, by insufficient testimony given by the appropriators themselves. * * * Most of these are really not appealing from the deerees as rendered by the board, but for the purpose of getting the matter before the courts so that additional testimony could be taken in relation to their claims, which testimony they had neglected to present before the superintendent. (First Rpt. State Engin., p. 81.)

Two of the recent decrees—the Laramie River and Blacks Fork decrees—have been appealed from on the same question. In both these cases the board held that the certificates should be issued to individual farmers under certain canals rather than to the companies owning the canals. The canal companies appealed, and the appeals are still in the courts. The usual practice under company ditches is to have the individual farmers submit proof and receive the certificates, but they must show as a part of their proof permanent agreements to take water from the companies building the ditches.

While an appeal is pending the order of the board is enforced unless the appellant files a stay bond in a sum fixed by the court, conditioned that he will pay all damages that may accrue to the appellee or appellees by reason of the order not being enforced.

Certificates are issued as soon as practicable after the issuing of an order and are by the secretary of the board transmitted, with the filing fees, to the county clerks of the counties in which the appropriations were made and by them filed.

A separate certificate is given for each enlargement.

The total number of certificates of appropriation issued from the organization of the office to November 30, 1904, about twelve years, and the acreage covered by these certificates, are shown in the table following. This includes certificates issued after construction under

permit (see p. 30), as well as those resulting from adjudications. The reports of the engineer from which these figures are taken do not separate these.

Number of certificates of appropriation issued by board of control.

Year.	Num- ber.	Acres.	Year.	Num- ber.	Acres.
1891-92.....	993	203,658.00	1899-1900.....	379	65,579.82
1893-94.....	548	55,442.36	1901-2.....	632	81,685.60
1895-96.....	1,010	113,270.41	1903-4.....	1,098	198,901.98
1897-98.....	947	108,986.71	Total.....	5,607	827,524.88

From the time the law was enacted there were persons who for various reasons refused to submit testimony to the superintendents, and their rights were therefore not included in the orders of the board. The State engineer in his first report recommended that some provision be made for forcing such parties to come into the adjudications in order that they might be complete, but nothing was done regarding this until 1901. In 1900 such a case came before the State supreme court,^a where it was held that under the law as it stood a party refusing to submit his claims to the board of control did not thereby forfeit his right, since the law attached no penalty to such refusal or failure, but the court intimated that it would be competent for the legislature to make the penalty the forfeiture of all rights to water. In 1901 such a law was passed (Laws 1901, p. 70). It provided also that those who prior to that time had failed to join in adjudications must within one year apply to the board for a hearing or forfeit their rights. This year extended from February 16, 1901, to February 16, 1902, and during that time thirty-six petitions were received. Two were received after the expiration of the year.

Most of the smaller streams of the State have been adjudicated, and some of the larger ones, but the large streams generally have not yet been taken up. There is as yet unappropriated water in these streams, and the pressure for a settlement of rights has not been so great as on the smaller streams. In some cases rights on the tributaries have been defined, while those on the main stream have not, although these rights may be interdependent. Under such circumstances, when all the rights have been adjudicated, the board is to give notice of times and places for placing on inspection all the evidence and its findings, when any finding may be contested by anyone not a party to the original adjudication in which it was made. After this inspection and hearing of contests the board is to make one decree covering the stream and its tributaries. No such case has arisen yet, but will when the North Platte River is adjudicated,

^a *Farm Investment Co. v. Carpenter*, 61 Pac., 258.

as the rights on its tributaries have been defined in separate proceedings.

The expense of an adjudication to a claimant is very small, outside of the \$1.75 fees, which must be paid to the superintendent when testimony is submitted. The cost of publishing notices is paid by the county in which the adjudication takes place, and the State pays for the surveys. The only expense to the claimant is the time it takes to make out his proof with the help of the superintendent, examine the proofs submitted by others, and present testimony in case of contest. The last might of course be expensive.

ACQUIREMENT OF RIGHTS.

As was stated, the Wyoming system of acquiring rights was at the time of its adoption entirely new to American irrigation law, although its general features are common to European countries. It is based on the theory that the State is the owner of the water and grants and controls rights to its use, instead of supervising the acquirement and regulating the enjoyment of rights to a public property. The supreme court of the State has, however, held that the latter is the correct theory (see p. 19). This distinction has so far made no difference, but questions may arise in the future when it will.

The person wishing to acquire the right to use water must before beginning construction make application to the State engineer and receive a permit from him. The engineer has authority to refuse an application when there is no unappropriated water in the source of supply or when its granting would be contrary to public policy, and since 1895 the engineer is empowered to require the applicant to show his financial ability to carry out the proposed work. The time within which the appropriation must be completed is fixed by the engineer, and on or before the expiration of this time the applicant must submit proof of having carried out the provisions of the permit. On receiving satisfactory proof that this has been done, the board of control issues a certificate of appropriation (see p. 22). If the appropriation is completed in accordance with the permit, the right dates back to the time of making the application.

The effect of this change from the old system of unrestricted filing of claims is stated in the first report of the State engineer as follows:

The superiority of this method of procedure over the former method of recording claims has been marked. The preliminary examination prevents the records being cumbered by incomplete or imperfect statements. Although a blank on which to make this application is furnished by the office, nearly one-half of those received have to be returned for corrections. The rejection of excessive claims or their diminution, by the engineer, has been a most effective educator and has forestalled numerous neighborhood controversies which were certain to arise under the unrestricted diversion heretofore permitted. So long as there was no examination of the statement filed, appropriators of a small volume of water would record claims to the entire stream, under the belief that they secured the right to the

full amount of their claim; and, believing this, there was a natural disposition to prevent, if possible, the use of any part of this by others. Under the present law the appropriator is restricted in the permit to the amount actually used within the time designated, and in this way all claim to the ownership of water for speculative purposes is averted.

The present law is destined to be a great aid in the construction of extensive canals. Such canals require a considerable period for their construction and an additional time after completion in which to apply the water to the intended use. Under the old law there was no security that smaller works would not divert and utilize a considerable portion of the water supply before the more extensive project could be brought into service. This is not possible under the present law. An approved permit is a guarantee from the State of the following facts:

- (a) That the engineer believes there is an adequate water supply.
- (b) That if the conditions of the approval are complied with no question can arise as to the date or amount of the appropriation.
- (c) That within the period fixed for the completion of the appropriation other appropriators will not be permitted to divert and absorb the water supply and that a limit will be placed on subsequent appropriations, thus obviating future conflicts with the owners of ditches for which there is no water.

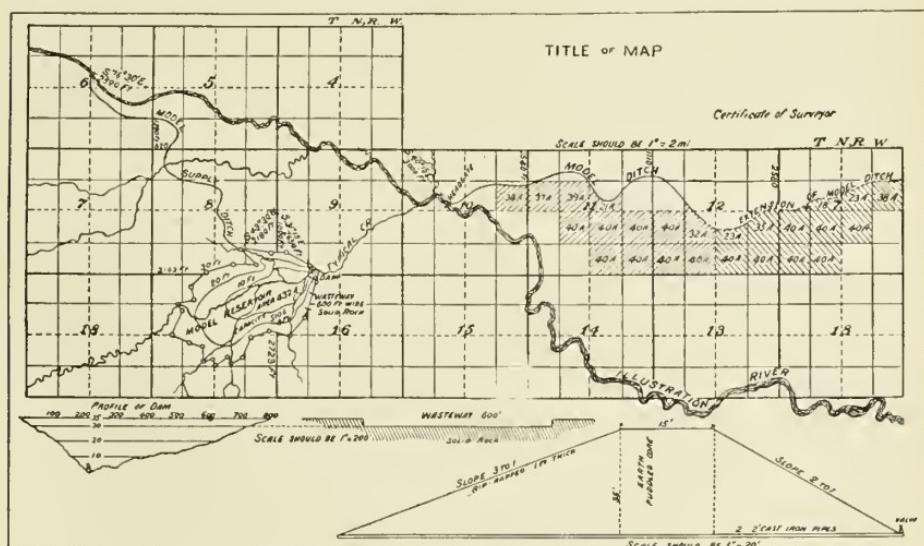


FIG. 1.—Sample map for applicants for water rights in Wyoming.

The first step in acquiring a right is to apply to the State engineer for the necessary blank. With the blank is sent a sheet of instructions, on the back of which is a sample map, reproduced in figure 1. The instructions are in part as follows:

APPLICATIONS.

Applications must be made upon the blank form approved by the State engineer, and all blank spaces are to be filled. Applications to enlarge existing ditches, or to increase the acreage watered therefrom, must be made on an enlargement blank, and the entire irrigation system must be shown complete from stream to end of ditch. In giving dimensions, remember the following:

"Width on top" is the width at surface water line. "Depth" is the depth of water which the ditch or canal is to carry.

The area to be irrigated must be given, where not measured an estimate must be made, and where only part of a subdivision is to be watered, the estimate must give the acreage in each 40 acres of these fractional subdivisions, with the number of acres marked in each.

The law requires applications to be made and approved by the State engineer before work begins. No application which states that work has begun or has been completed will be approved.

MAPS.

Each application must be accompanied by two maps, one of which must be on tracing linen.

These maps must be neatly and accurately drawn with India ink to a scale of 2 inches to the mile, and on sheets not less than 9 by 12 inches.

They must show the location of the head gate by courses and distances from some government corner. They must show the actual location of the ditch or canal, and where government survey lines are crossed, the distance to the nearest corner must be given. (Where corners can not be found, give the location of line by courses and distances.)

The map must show the course of and name of stream from which water is taken; the location and area of land to be irrigated, or place where water is to be used for other purposes. (This may be done by marking the boundaries or by coloring the areas.)

Whenever the canal line crosses streams or other ditches the location of such crossings must be shown, and such intersecting streams and ditches must be marked by ink of a different color.

Maps must contain the name of the ditch, canal, or reservoir, and the post-office of the surveyor, with date of survey.

RESERVOIRS AND DAMS.

Applications for reservoirs and dams must be accompanied by a map in duplicate on tracing linen, showing the dimensions and location of the reservoir. The dam must be tied to some government corner by courses and distances.

Plans of dams, cribs, or embankments must be drawn on longitudinal scale of not less than 1 inch to 200 feet and for cross sections of not less than 1 inch to 20 feet. Timber, brush, and stone, where used, shall be shown in detailed plans, the scale of which shall be 1 inch to 4 feet. The plans for outlet and waste ways for reservoirs shall be drawn on a scale of 1 inch to 4 feet, and are required for all dams over 5 feet high in a running stream or for any other dam over 10 feet high.

The maps of reservoirs shall show the total area to be submerged and enough levels to permit of computing their capacity.

For earth dams the slope must not be less than 3 to 1 for the front or water side, and 2 to 1 for the back.

NOTE.—Lands may be shown by tinting with a colored pencil on the dull side of the tracing linen and this rubbed to an even tint by means of a medium hard rubber eraser. Where an enlargement application is made, the lands under existing rights through the same ditch should be shown in different colors. Colors which will not blueprint well should not be used. The preferred colors are: Green, orange, red, and yellow. Lettering on a map should be sparing and superfluous matter should not be placed thereon. Indelible pencil or a typewriter should not be used on tracing linen, since the oil in the cloth will cause these colors to spread and in time it becomes almost obliterated. The affidavit of the surveyor should be neatly lettered on the map. In preparing an application the 40-acre subdivision in which the head gate is situated should be stated and the bearing and distance to the nearest government corner should be given. In case of an enlargement, if the applicant is the owner of the ditch to be enlarged, he should so state, if not, the written consent of the owners must accompany the application. The following form for consent to enlarge may be used.

_____, 190_____.
_____, 190_____.
_____, 190_____.

I (or we) _____, the sole owner of the _____ ditch taking water from _____, under permit No. _____, do hereby give my (or our) free and voluntary consent to the enlargement or

extension of and to the use of water through the said ditch by ——, according to the terms of this enlarged permit.

The application must show the name and post-office address of the applicant, use to which the water is to be applied, the name of the ditch or canal, the source of water, location of head gate, the length and dimensions of the ditch, the character of the material to be moved, the amount of tunneling and fluming, estimated cost of the works, description of the lands to be irrigated, time when work is to begin, time when the works are to be completed, and the time when the water is to be applied to a beneficial use.

An application is given a temporary number and acknowledged as soon as it is received. When it has been approved it becomes a permit and is returned to the applicant with a notice calling his attention to the law requiring the submitting of proof of completion of works, to which is attached a stub to be used for this purpose.

Unless proof of completion has been previously received, a short time before the expiration of the time allowed for the completion of works under a permit notice is sent calling the attention of the appropriator to the fact that the time is about to expire and warning him that unless proof is submitted within thirty days his permit may be canceled.

The proof of appropriation must show the name and address of the appropriator, the permit number, purpose for which the water is taken, the dates of beginning and completing construction and of applying the water to a beneficial use, the dimensions of the ditch, description of the land irrigated, crops grown, the time during each year when the water is used, the amount of the investment in the ditch, the estimated cost of preparing land for irrigation, and a statement as to whether the map filed with the permit shows correctly the completed works and the lands irrigated. This statement must be sworn to by the appropriator. The proof of appropriation is accompanied by a statement from the superintendent of the water division in which the works are located that he has examined the works and found them to be as stated in the proof, or otherwise, as the case may be; that the proof has been open for public inspection, and that he recommends that the certificate of appropriation be issued in accordance with the proof.

Applications for the enlargement of existing works are made on forms substantially the same as those used for original applications, except that they have blanks for descriptions of the works as they are and as they are to be enlarged.

Under the original law no fees were required and maps were to be filed within six months after approval of the application, instead of with the application, as is done now. In his second report the State

engineer called attention to two evils resulting from these provisions. He said:

Parties who have no well-defined idea of constructing ditches file applications for permits simply because it costs nothing * * *. The tendency of recording speculative filings is only one of the evils. The more aggravating one is the carelessness with which many of the statements are prepared.

The same report shows the operation of the law at that time. Four hundred and seventy-two applications were received, to reclaim 1,275,303 acres. Plats were filed with 325 of these. Extension of time for filing plats was granted in 10 cases. Sixteen applications were rejected because of no unappropriated water in the source of supply, 26 were canceled for failure to file plats or because of notice of abandonment from applicant. Before a permit is canceled two notices are sent to the applicant, in order that he may have opportunity to show cause why it should not be done.

In response to recommendations of the engineer the legislature of 1895 provided for the payment of fees, that maps and plats of prescribed form and size be filed with the application, rather than within six months after its approval, and authorized the engineer to satisfy himself as to the financial responsibility and good faith of the applicant before approving an application. This resulted in a great improvement in the character of applications and the accuracy of the maps filed.

Another safeguard recommended by the engineer in his first report was the publication of notice of an application in order that those whose interests might be affected by its approval might have a hearing before the engineer. This has not been adopted, but it is the practice of the engineer to furnish statements of the applications received to the newspapers of the State, so that they are usually published. This provision has been adopted by several of the other States.

A question which early arose was whether a permit for the appropriation of water for a given area of land is exclusive. Logically it would seem that it should be. The right is supposedly attached to the particular tract of land described in the permit, and is limited to 1 cubic foot of water per second to 70 acres. If two permits covering the same land are issued, the engineer's office is in the position of having authorized the diversion of 2 cubic feet of water per second for a single tract of 70 acres. It is true that no one can get a certificate of appropriation until proof of actual beneficial use is made, and consequently only one right can be acquired for a given tract, but until the time for final proof there would be two parties with permits to acquire a right to which only one could finally receive title. On the other hand, the effect of making permits exclusive, under certain circumstances, works great injustice. Under the Wyoming law and practice there is no requirement that the applicant shall own the land which the proposed canal is

to water; in fact, under large canals they seldom do. An exclusive permit under such circumstances makes the owner of the land entirely dependent on the holder of the permit, since he is barred from acquiring a water right for his own land except through the holder of the permit. The evils of this latter situation appealed more strongly to the Wyoming engineers than the logic of the former, and they have therefore never held that permits were exclusive. In his second report the engineer stated his position on this matter as follows:

The State having given a permit to use water for the irrigation of certain lands, and fixing a time for its completion, no other permit should be issued covering the same land until the first shall have expired. This course has been adhered to in all cases where parties having prior claims show their intention and ability to proceed without delay with the work. (Second Rpt. St. Eng., p. 54.)

In his next report the engineer, referring again to this subject, says:

In all these cases it has been the effort of the engineer to take such action as would secure the most effective reclamation of land and the best use of our water supply, and where this has required the issuance of a second permit, describing the same land, then such permit has been issued, but whenever the question was in doubt or where the issuance of a second permit tended to interfere with the carrying out of a project already under way, all such applications have been rejected. (Third Rpt. St. Eng., pp. 63, 64.)

The opposite interpretation has been given in Nebraska (see p. 45).

While the engineer has authority to reject an application when there is no unappropriated water in the source of supply mentioned in the application, and this has sometimes been done, it is not the usual practice. There is usually some flood water, and always the possibility of an increased supply from seepage or more economical use by the holders of prior rights, and consequently permits are frequently granted when the records of the engineer's office show little unappropriated water. The location of the proposed diversion is taken into account in such cases. If it is at the lower end of a stream where interference with prior rights is impossible the permit is granted, while if it is on the upper part of a stream where there will always be the possibility of interfering with lower prior users, the permit may be refused. Another practice recently adopted is to ask the applicant to get the written consent of the prior appropriators from the same source. When this is secured the permit is granted. In all cases where the records show little or no unappropriated water, that fact is stamped across the face of the permit. The form of this notice is as follows:

The records of the State engineer's office show the waters of _____ to be largely appropriated. The appropriator under this permit is hereby notified of this fact and that the issuance of this permit grants the right to divert and use the surplus or waste water of the stream and confers no rights which will interfere with or impair the use of water by prior appropriators.

Since the adoption of the present system of acquiring rights a number of canals have been built without complying with the law regarding making application to the State engineer. The status of such ditches

was referred to the attorney-general of the State, and in 1893 he gave it as his opinion that the board of control can not issue a certificate of appropriation to such a party except after the issuance of a permit. The party can, however, make application, receive permit, make proof of appropriation, and receive certificate, even if the works were completed before the application was made. (Second Rpt. St. Eng., p. 195.) In 1896 the engineer issued instructions to the superintendents in accordance with this ruling, stating that they should refuse to take proofs of appropriation for ditches built after the enactment of the law without compliance with its provisions. (Third Rpt. St. Eng., p. 69.) The builders of these ditches were required to make application in the regular way. The circular of instructions sent out with blanks to applicants (see p. 25) is not in accord with this ruling, where it says, "No application which states that work has begun or has been completed will be approved," and is not lived up to.

Since the organization of the engineer's office there have been approved 6,292 applications for the construction of new ditches and 1,269 applications for permits.

The procedure for making proof of appropriation is not laid down by the law, which provides for the issuance of the certificate "upon its being made to appear to the satisfaction of the board of control that any appropriation has been perfected in accordance with such application and the indorsement thereon by the State engineer." It has always been the intention to have each ditch built under permit inspected by the superintendent of the division in which it is situated before certificate is issued, but this has not always been possible, and where ditches are in remote districts certificates have sometimes been issued on the reports of water commissioners. (Third Rpt. St. Eng., p. 47.) In 1901 a law was passed authorizing this practice where permits have been issued since the streams in question were adjudicated.

The present procedure under the rules of the board of control is as follows:

The rules of the board * * * require before the issuance of a certificate of appropriation under a permit that the respective superintendents make personal examination of all such ditches at the time of submission of proof by the appropriator and subsequently, after publication of notice in a newspaper circulating in the vicinity, fixing a time and place, they appear and open all such proofs to public inspection, when any interested appropriator has an opportunity to make any objections he might have to any such proofs. (Rpt. St. Eng., 1901-2, p. 66.)

The superintendents have never been able to keep up with this work, and there are a great many ditches which have been completed and whose owners have notified the State engineer of their readiness to submit proof of this fact, for which proof has not been taken. In the spring of 1903 there were 1,029 such ditches on record in the engineer's office, and steps were at once taken to systematize this work in order

that it might be brought up to date. Previous to that time the superintendents had no list of such ditches in their divisions, and had taken proof as opportunity offered and when specially requested by the ditch owners. Under the new plan, a card index of all such ditches has been prepared, arranged by streams. On a card are placed the name of the stream, the permit number, references to the records, the name of the applicant, the name of the ditch or reservoir, the priority number, the date of appropriation, the amount of water appropriated, and the description of the lands for which the permit was granted. A set of these cards showing all such ditches in his district is furnished to each superintendent, giving him full information as to ditches awaiting proof. Now whenever he goes into the field he refers to his index, and if there are completed ditches in the section he is to visit the cards are taken along and proof is taken while he is there. This is rapidly bringing the work up to date and cutting down the expense to the lowest possible figure, as very little travel is undertaken for the especial purpose of taking proofs. To further expedite matters, the superintendent of district No. 3 has recommended that the board accept the testimony of two or more disinterested witnesses, as is done in proving up on desert-land claims. This suggestion has not been acted upon by the board of control, however.

Perhaps the most important reason for keeping up to date in taking proof of appropriation and issuing certificates is that a great many ditch owners are taking up land under the desert-land law and need the certificates in making final proof on their lands. The General Land Office originally required the certificate with final proof on land, but the State got so much behind in this matter that the Land Office amended its rules in 1899 as follows:

Proof, if otherwise satisfactory, will be accepted upon the filing of a certified copy of their approved application, together with proof that they have completed the appropriation in the manner required by the State laws and regulations and properly reported that fact to the State engineer, and this evidence will be taken as sufficiently establishing their clear right to the use of water. (Rpt. St. Eng., 1899-1900, pp. 62-63.)

This rule was changed in 1904, and the certificates are now required by the General Land Office. The average cost of acquiring a water right under the present procedure has been about \$13.

DISTRIBUTION OF WATER.

The Wyoming system of distributing water is copied from the Colorado system and is in general the same (see pp. 11-16). There is, however, a more direct control over the water commissioners by the superintendents. The authority of the engineer over the division superintendents in the matter of distributing water has been questioned, and in 1901 the opinion of the attorney-general on this question was asked. He upheld the authority of the engineer.

Consistently with this, anyone deeming himself injured by any act of a water commissioner may appeal to the superintendent, from him to the State engineer, and from the engineer to the district court.

The distribution of water has always been hampered by the existence of unadjudicated rights. The water commissioner has no guide in such cases, yet the rights are unquestioned although undefined. In many cases the holders of these rights refused to recognize the authority of the commissioner and also refused to submit testimony in adjudications. However, this was remedied so far as adjudicated streams are concerned by the law of 1901, compelling such parties to submit their rights to the board of control, on penalty of forfeiture. On unadjudicated streams there is still this trouble.

Another phase of this same question was settled by an opinion of the attorney-general in 1901. That was the status of rights under permits, for which certificates had not been issued. Complaints were made by the holders of such rights that they were being interfered with by subsequent but adjudicated rights. The opinion of the attorney-general on this point was that the commissioners should deliver water in the order of the dates of permits, provided the ditches were ready to receive it, the permits being as binding on the State as certificates. (Rpt. St. Eng., 1901-2, p. 51.)

The general instructions to the water commissioners are to get the largest possible service out of the water supply, but that priorities must be enforced when demanded, even if the supplying of 1 cubic foot per second at the head of an early ditch requires the loss of 10 cubic feet per second in the sand of the channel.

Commissioners were formerly to begin work on the call of two or more persons having rights to water, but it frequently happened that one person whose rights were being interfered with could not secure the signature of a second person to his call for the services of the commissioner. The law was therefore amended in 1901, authorizing the commissioner to begin work on the call of one appropriator, if the commissioner deems it sufficiently important.

Appropriators are required to maintain head gates and measuring devices to the satisfaction of the superintendent of the division, and standard plans have been sent out by the State engineer. The original law requiring these structures provided that in case of neglect to put them in after thirty days' notice from the superintendent, that officer was to report the matter to the county commissioners, who were to put in the structures at the expense of the county and assess the cost against the land in case the appropriator refused to pay it. Under this law a party could delay action for a whole season, and county commissioners might even then refuse to act, rendering it impossible to secure the putting in of the structures. On the recommendation of the engineer this law was amended in 1901, providing

that if an appropriator neglects to put in the structures within ten days after notice from the superintendent, the commissioner is to close the ditch to the passage of water, and that when the superintendent has ordered a measuring device put in for a reservoir in the channel of a stream and it has not been done the commissioner is to draw off the water. This has been found to be the only effective way to compel the putting in of head gates and measuring devices in other States as well as Wyoming.

Interference with head gates which have been set by a water commissioner has always been a misdemeanor, but until the use of water through a canal closed by a commissioner was made *prima facie* evidence of having opened the gates (Laws 1901, sec. 971) it was almost impossible to secure convictions unless the person was actually caught by the commissioner himself in the act of opening the gate. Those caught using water usually claimed that some person unknown to them had opened the gates. The penalty for interfering with a gate set by a commissioner is a fine not exceeding \$100 or six months' imprisonment, or both fine and imprisonment. Another common way of accomplishing the same purpose as changing a gate is obstructing the stream channel below a gate only partially closed, thus increasing the flow through it. The superintendent of division No. 2 recommended in 1900 that this also be made a misdemeanor, and the law regarding changing gates as amended in 1901 seems to cover this in the clause "willfully use or conduct water into or through his ditch which has been lawfully denied him by the water commissioner or other competent authority."

The law makes it the duty of the water commissioner to so regulate and control the use of water in his district as to prevent the waste of water, but it has been the usual practice of the commissioners to pay no attention to what became of the water after it was turned into the heads of ditches, and to give to each ditch owner the entire amount of his right so long as it was called for and the stream supplied it. This led to frequent complaints from the holders of late rights who were unable to secure water while others were using it wastefully. June 26, 1902, the State engineer issued an order to the superintendents calling their attention to the law against waste and stating that "it is unquestionably the duty of the water commissioner to make whatever examination may be necessary to determine whether water is being wasted, or wastefully, extravagantly, or wrongfully used when needed by others, and to shut off the water from any ditch to whatever extent may be necessary to prevent such wasteful or wrongful use." (Rpt. St. Eng., 1901-2, p. 31.)

When reservoir owners wish to use the channel of a natural stream for conveying stored water it is their duty to notify the com-

missioner in charge of the stream and supply him with a list of the parties entitled to divert the water. The commissioner then distributes the water to those entitled to it, half of the expense of this distribution being charged against the county and half against the owners. The county commissioners collect this from the owners, and in case of nonpayment tax it against the reservoir.

It is not possible to get at the exact expenses of the distribution of water by public officials, but in his report for 1901-2 the State engineer gives the results of an inquiry along this line. In division No. 1 the expense for distribution in 1902 was 5 mills per acre for adjudicated rights; estimating unadjudicated rights as covering an equal area, the expense for the whole was 3 mills per acre. In division No. 2 the expense for adjudicated rights was 5.8 mills per acre, but in division No. 3 it was 34 mills per acre. This large expense was caused by the employment of a large number of deputies on Grey Bull River, the expense on this stream being 6 cents per acre. No figures are given for division No. 4.

MISCELLANEOUS DUTIES OF THE STATE ENGINEER.

Duplicate plans of all dams above 5 feet in height in running streams and all dams intended to retain water above 10 feet in height must be submitted to the engineer, and his approval must be secured before construction begins. The engineer has authority to inspect during construction any such dam, or any ditch, canal, or other work carrying over 50 cubic feet per second, and may order any changes he deems necessary for the security of the work or the safety of those residing below. The engineer is also to examine any irrigation works complained of by anyone living in the neighborhood of the works, but may require the complainant to put up the cost of the inspection. If the complaint proves to have been justified, this cost may be assessed against the owners of the works, and the deposit refunded to the complainant. There have been a large number of plans of dams filed. Until 1895 there was no provision for inspection, and it was found that plans were made to conform to the requirements of the engineer, and after approval were abandoned. For small dams the engineer thought best to let matters run along as they were, since inspection would be too expensive. The law providing for inspection was passed in 1895. No cases have arisen under the provision for complaints as to the safety of works.

Since 1903 those wishing to construct reservoirs are required to apply to the engineer for permits in the same manner as for ditches, except that the lands to be watered need not be described, as it is the expectation that the water will be sold. The engineer is authorized to appoint an assistant to supervise the construction of reservoirs whenever he deems it necessary. The orders of this assistant are to be

obeyed by those in charge of the work, except that they may appeal to the State engineer, whose decision is final. The expense of this supervision is to be paid by the applicant. The engineer may cancel the permit if his orders are not complied with. The practice under this act has been for the builders of a reservoir to employ an engineer who is satisfactory to the State engineer, and only the most general supervision is exercised by the latter.

All proposals to reclaim land under the Carey Act are submitted to the State engineer, who examines them and determines—

Whether or not the proposed works are feasible; whether the proposed diversion of the public waters of the State will prove beneficial to the public interest; whether there is sufficient unappropriated water in the source of supply, and whether or not a permit to divert and appropriate water through the proposed works has been approved by him; whether the capacity of the proposed works is adequate to reclaim the land described; whether or not the proposed cost of construction is reasonable, and whether or not the maps filed in his office comply with the requirements of said office and the regulations of the Department of the Interior; also whether or not the lands proposed to be irrigated are desert in character and such as may be properly set apart under the provisions of the aforesaid act of Congress and the rules and regulations of the Department of the Interior thereunder. Whenever the State engineer shall be unable, from an examination of the maps and field notes submitted for his examination, to determine whether or not the proposed irrigation works are feasible and adequate, whether or not the proposed cost of construction is reasonable, or whether or not the proposed diversion of the public water is beneficial to public interest, and whether or not the lands proposed to be irrigated are of such a character as to come under the provisions of the aforesaid act of Congress, the board may direct the engineer to make or cause to be made by some qualified assistant such survey or examination as will enable him to report intelligently thereon to the board.

In addition the applicants must secure from the engineer a permit to appropriate water in the regular way. Under this act 556,593.39 acres have been segregated, and about 50,000 acres patented.

Parties wishing to float or drive logs in any of the streams of the State must apply to the State engineer for permission to do so, and must, if required by the engineer, give bond in a sum to be fixed by the engineer for the protection of irrigation ditches and property along the stream.

The board of control has uniformly held that water rights should be and are attached to the land in connection with which they are acquired, but in practice the board has sometimes departed from the rule. Where the original land has been ruined the old certificate has been recalled and a new one issued describing the land to which the right is transferred, bearing the date of the original certificate, and an explanation of the change made. In 1904 the supreme court of the State overruled the board of control in this matter and held that rights can be transferred if others are not injured^a by the change. One of the chief objections to transfers has been that they destroyed the value of the record of the State engineer's office as a guide for the

^a *Johnston v. Little Horse Creek Irrig. Co.*, 79 Pac., 22.

distribution of water. However, this objection was removed by the passage of a law in 1905 providing for notice to the engineer when a transfer is made. A transfer is to be made by deed, which is to be recorded with the county clerk of the county where the water is used and with the State engineer. The official distributing water is not required to take any notice of a transfer until the deed is recorded, and not then if in his judgment or that of the board of control it is injurious to any person not a party to the transfer, until the validity of the transfer has been established by a proper court. If the transfer is recognized a notice of this fact must be published in a newspaper having general circulation in the county where the transfer is made, at the expense of the party making the transfer. In case the transfer is not recognized, the party to whom the right is transferred may sue for injunction to restrain the State officials from interfering with his enjoyment of the right. Notice of this action must be published, and any appropriator has the right to intervene and have his rights in relation to the transfer fully determined. In case an injunction is granted which is afterwards found to have been wrongfully obtained the appropriator intervening has the same right to recover damages as if he had originally been a party to the action. The attorney-general of the State is to appear for and defend the irrigation officials whenever they are made parties to any court proceeding.

The effect of this law has been that parties intending to make a transfer consult the State engineer in advance to determine whether he will recognize it if made. It insures that no transfer will be made without full notice to all interested parties, and to the State water officials, and puts on the one wishing to make the transfer the expense of advertising it and the liability for damages if he persists in making the transfer when it has been denied by the State officials.

Another class of transfers is still unprovided for. These are transfers of lands which carry with them the rights to water. There is no provision for making a record of such transfers in the State engineer's office, and consequently the records do not show correctly the ownership of rights. It is frequently desirable to send notices to water-right holders, and often these notices are not received, because the original owner has transferred his land and water right and left the State. Legislation to cover this has been recommended but never passed.

APPOINTMENT, QUALIFICATIONS, AND PAY OF OFFICIALS.

The office of State engineer is created by the constitution, Article VIII, section 5. He is appointed by the governor, confirmed by the senate, holds office for six years, and receives a salary of \$2,500 per annum. No person is eligible "who has not such theoretical knowledge and such practical experience and skill as shall fit him for the position.

The superintendents of the four water divisions are appointed by the governor with the consent of the senate, serve four years, must reside within their respective divisions, and receive salaries of \$1,200 per year and necessary traveling expenses, paid by the State since 1903. Before that they received \$8 per day for the time actually employed. Until 1903 the superintendent of Division No. 1 was also secretary of the board of control and received a salary of \$1,500 per year. As the work of the board increased it was necessary to have some one constantly in the office of the board, and the office of secretary of the board was created. The salary is \$1,200 per year, paid by the State.

Water commissioners are appointed by the governor from lists of persons submitted by the superintendents of the divisions where they are to serve, and must be residents of their respective districts. The term is two years, and the pay \$5 per day for each day actively employed in the duties of the office. This is paid by the counties, each county paying for the work done within its limits. Commissioners have power to appoint suitable assistants, who receive \$4 per day, but may not receive pay for more than thirty-five days in any one year. The superintendents have repeatedly recommended that the provision that commissioners must be residents of their districts be repealed, because they have found difficulty in finding suitable persons who would accept the office, but this has not been done. In a number of counties commissioners have been put on salary of \$75 per month by agreement between water commissioners and county commissioners. Districts are being divided to avoid the necessity for traveling long distances to do a very little work.

RECORDS OF OFFICES OF STATE ENGINEER AND BOARD OF CONTROL.

When an application for permit is received in the office of the State engineer it is filed and a receipt is sent to the applicant. The filing books are numbered, and the pages each contain spaces for the records of six applications, showing the name of the stream, the name of the ditch or reservoir, the name of the applicant, his post-office address, and the disposition made of the application. On its receipt an application is recorded in such a book and given a temporary number, which shows the book, page, and position on the page where it is recorded. It is then placed in a case with all other applications from the same division which are not yet acted on. Upon examination they are placed in another case of "Applications for approval." When approved they are filed in a third case awaiting recording. They are then recorded, given a number, and mailed to the applicant. The pages of the record books are similar to application blanks (see p. 25), and the applications are copied into these

books in the order of permit numbers. Applications for original construction and those for enlargements are kept in separate books. In these record books and on the face of the recorded permits record is made of all subsequent action under the permits. Such notes as "Notice of expiration sent November 1, 1901," "Canceled," "Completed, proof submitted October 15, 1904," "Certificate issued January 1, 1905," appear on these records. Maps received with applications are kept with them until given a permit number, when they are folded and filed in cases by the permit numbers.

All records are indexed on cards by streams and by the legal subdivisions in which the works are located. The cards of the stream index have at the head the name of the stream from which water is taken and the name of the stream of which this is a tributary. On the cards are columns for permit numbers, names of applicants, names of ditches, dates of filing, location of head gates, and priorities (date). The land description cards have at the head the township, range, and division numbers and columns for the sections, permit numbers, names of streams, ditches, and applicants. In each case the permit number is sufficient reference to the other records of the office. Adjudicated territorial rights are also included in this index. All correspondence is card-indexed by the name of the correspondent, and on these cards are placed the permit numbers if the persons are appropriators of water. The records are therefore indexed by the name of the person, the name of the stream, and the location of the land reclaimed.

There are on file in the engineer's office, in addition to the maps submitted with applications, maps made by the engineer in adjudicating territorial rights and taking proof under permit. From all of these the engineer is making township plats on the scale of 2 inches to the mile, showing the ditches and the lands irrigated by each. These are made on tracing linen, and the lands irrigated by different ditches are shown in different colors. It is the intention to make these cover the entire State, and as new ditches are built they will be placed on these maps.

All fees received by the engineer are entered in a book as they are received, deposited in a bank, and turned over to the State treasurer at the beginning of each quarter.

The records of the board of control consist chiefly in the minutes of the meetings of the board, containing all orders made by the board, and the proofs of appropriation taken by the superintendents. The proceedings of the board are indexed only in an ordinary alphabetical index. The proofs of appropriation are given numbers and are filed by these. From these the superintendent makes a tabulation for submission to the board. These tabulations are made in loose leaf books having columns showing general priority number, stream priority

number, name of ditch, name of stream, name of appropriator, post-office address, date of appropriation, use to which water is applied, amount appropriated in cubic feet per second, number of acres irrigated, and description of lands irrigated. If any changes are made by the board in its final adjudication, they are put on these original sheets in red ink. These are bound in books and form the records of adjudicated rights. Certificates are made out by the secretary from these tabulations. These are in books with duplicates, one copy being sent to the appropriator and the other retained in the form of a stub. The certificate has on it the book and page containing the stub.

The secretary of the board keeps also a card index showing the status of rights under permit (see p. 31) for use of the superintendents in taking proof on such rights. He also prepares tabulations of all rights for use by the water commissioner in distributing water. These are made out by streams and show the permit number, the general priority, stream priority, name of ditch, name of appropriator, amount appropriated, and number of acres.

FEES.

The State engineer is to collect the following fees, which are to be paid into the general fund of the State:

Filing and examining applications and map, \$2; recording any water-right instrument not specified above, \$1 for first 100 words and 15 cents for each additional folio; for issuing certificate of appropriation, \$1; for making certified copy of any document recorded or filed in his office, 15 cents per folio, and \$1 for each certificate attached thereto.

Prior to 1895 there were no fees. The fees received since that time are shown in the following table:

Fees received by State engineer's office.

1895.....	\$673. 90
1896.....	910. 80
1897.....	1,089. 55
1898.....	1,098. 80
1899.....	1,465. 70
1900 to November 30.....	1,800. 50
1901-2 to November 30.....	4,748. 05
1903-4 to November 30.....	5,820. 79

In his report for 1903-4 the engineer calls attention to the fact that the amount of money turned into the treasury by the office was \$34.64 in excess of the entire contingent fund at the disposal of the office for the same period.

When an appeal is taken from the board of control to the court, a transcript of the records of the board must be filed with the court by the appellant. The fees for making transcripts for the two years ending November 30, 1904, amounted to \$813.85.

NEBRASKA.

In 1895 Nebraska adopted a system of water administration similar in outline to the Wyoming system, but differing considerably in detail. It provided for the administrative defining of existing rights, for the acquirement of rights under State supervision, and for the distribution of water by State officials.

The State board of irrigation is at the head of this system, but this differs from the Wyoming board of control in that it is composed of State officials having other duties instead of officials having to do only with the administration of water laws. The board is composed of the governor, the attorney-general, and the commissioner of public lands, the governor being president. The board elects a secretary, who must be a hydraulic engineer, and is commonly called the State engineer. The secretary, with the consent of the board, employs an assistant, who must be an engineer.

It is made the first duty of the secretary to measure or cause to be measured the flow of the streams of the State and to make additional measurements from time to time for the information of the board in considering applications to appropriate water and controversies that arise in the distribution of water.

Prior to the passage of the law of 1895 there was no provision for defining water rights except as controversies arose, and until 1889 no prescribed procedure for acquiring rights. In fact, it was not settled whether rights could be acquired by appropriation or whether riparian owners alone could use the water of the streams of the State. In 1889 a law was passed providing for the acquirement of rights by the prevailing method of posting and filing notices, building works, and using water. It has since been held that the passage of this law abrogated the riparian rights of lands still belonging to the General Government, and that prior to 1889 rights to water were acquired both by the acquirement of riparian lands and by appropriation, and in case of conflict priority of acquirement was to govern. (*Crawford v. Hathaway*, 93 NW., 791.)

DEFINING RIGHTS.

The first work undertaken by the State board of irrigation after its creation was the defining of existing rights to water.

Preparatory to the adjudication of existing rights the county clerks were required to send to the board transcripts of all claims to water on file in their respective offices. For this they were to receive 5 cents per folio, to be paid by the counties, or they were allowed to send in the original records without compensation. Such transcripts were received from 44 counties, containing 780 claims. In all, about a thousand claims to rights under the old laws have been filed.

No method of making adjudications has been prescribed by law, this matter being left entirely to the board. Rules were at once adopted under which the adjudication is made by the secretary, from whose decision appeal may be taken to the board. In case there is no appeal, the board merely adopts the report of the secretary. As soon as the records were received from the county clerks, blank claim affidavits were sent to all parties having claims on file. The years immediately preceding the passage of this law had been years of great activity in ditch building, but many of these ditches were not completed. The board therefore decided that it should consider their rights along with the others, and, in addition, to determine how much water they were entitled to, fix the time within which the work should be completed and the water put to beneficial use. The blanks sent out therefor contained questions as to the plans of claimants and the time required for carrying them out. The affidavits were to state: The name and residence of the claimant, the purpose of the appropriation, the names of the ditch and stream, the quantity of water claimed, the location of the head gate, the length of the ditch and the sections of land through which it passed, a plat of the ditch and its dimensions, the amount of excavation in cubic yards and the length of fluming, the amount of work done at time of making affidavit, the estimated total cost and cost to date, the description of the land to be irrigated, the date of beginning construction, the dates of completion and of use of water, the dates of first use of water, the area and crops irrigated at time of making affidavit, and the relation which subscriber bore to the work. Blanks for power rights were also sent. Each blank sent out specified the time within which it must be returned properly filled out.

After these claim affidavits are received hearings are set at convenient points. The secretary mails to each claimant, at least ten days before a hearing, a notice of the dates and places of hearings, and if the post-office address of any claimant is unknown the notice is sent to the clerk of the county where the adjudication is to take place. The rules for such hearings are as follows:

Said hearings shall be held for the purpose of receiving testimony offered by parties in interest, in support of rights claimed, and shall be presided over by the secretary, assistant secretary, or one of the under secretaries of this board, who shall keep a complete record of the proceedings thereof.

All evidence, whether oral or in the form of depositions, shall be submitted in typewritten form. If oral, it shall be taken down and transcribed at the expense of the claimant offering the same.

Claimants may appear in person or by attorney, but appearance must be made on the day or days specified for the hearing for the county within which the said claim is located.

Claimants having filed with the secretary of this board, ten days previous to date of first hearing announced, claim affidavits in the form prescribed and entitled "Claim for the waters of the State of Nebraska," need not appear at said hearings unless they wish to offer additional testimony in support of their claims.

Points of law made by claimants or their attorneys, together with the authorities cited in support of the same, must be submitted in typewritten form.

The record in the case of each claim shall consist of—

First. The original notice filed with the county clerk.

Second. A claim affidavit signed and verified.

Third. Additional testimony offered at hearing in support of claim.

Fourth. Points of law and authorities cited in support of same submitted in writing.

Fifth. Decisions of secretary.

All matters set forth in claimant's notice of appropriation posted at the proposed point of diversion and filed with the county clerk in accordance with the provisions of the irrigation law of 1889 and the claim affidavit in the form provided by the State board of irrigation, entitled "Claim for the waters of the State of Nebraska," filed with the board in support of claim, together with any other ex parte affidavits offered for the same purpose, shall be accepted as true, provided there shall be no contest in reference thereto, or that the contrary shall not appear upon investigation by the board or an officer thereof upon its own motion.

In case a claim affidavit has not been filed in the form and at or before the time prescribed with the State board in support of a claim deemed to have accrued prior to April 4, 1895, failure to make appearance and file such affidavit at the time and place of hearing set for the county within which such claim is located shall be deemed to constitute an abandonment thereof.

Anyone wishing to contest a claim files with the board a notice stating the ground for contest and proof of having served notice on the opposite party. The latter has fifteen days in which to answer with proof of service on contestant, who then has ten days in which to reply. If contestee is a nonresident, the board is notified, and notice is given by publication. When issues have been made up in this way, the secretary sets a place and date for hearing the contest and notifies each party. These hearings are held by the secretary, as are the original adjudications.

Copies of decisions of the secretary in adjudications or contests are mailed to all parties in interest on the day on which they are made. Anyone dissatisfied with such a decision may, within ten days after receipt of a copy, ask for a rehearing before the secretary, setting forth the grounds for the petition. No appeal may be made to the board until such an application for rehearing has been made and acted on by the secretary. Any time within fifteen days after a decision of the secretary on rehearing appeal may be taken to the board. The appeal must be accompanied by a typewritten brief and proof of service on the parties adversely interested. All pleadings, affidavits, etc., must be typewritten. The review by the board will be by brief. Rehearings before the board may be applied for at any time within forty days. Appeals may be taken from the rulings of the board to the courts, but very few have been taken.

All decisions of the secretary from which appeals are not taken are affirmed by the board.

Surveys made by the secretary or his assistants before adjudications are not required, as they are in Wyoming, but have been made in many cases, although not always.

The claims under the old law were nearly all adjudicated between April 4, 1895, when the law went into effect, and November 30, 1898. The secretary, in his report for 1897-98, states that at that date there were 995 claims on record, 947 of which had been passed upon, leaving 48 cases to be disposed of. In the period covered by the report there were also 12 rehearings before the secretary and 1 appeal to the board from the secretary.

The law provides that within thirty days after the determination of the rights on any stream the secretary shall issue certificates setting forth "the name and post-office address of the appropriator, the priority number of each appropriation, the amount of water appropriated, and the amount of prior appropriations, and if such appropriation be for irrigation, a description of the land to which the water is to be applied, and the amount thereof." On account of the large number of uncompleted ditches at the time the adjudications were made it was impossible to comply with this law, since both the amount of each appropriation and the amount of prior appropriations depended on the areas reclaimed by these uncompleted ditches.

In 1900 the secretary decided to make an effort to get proof on the rights which had been determined conditionally in previous adjudications. The time allowed for many of these had expired, and blank proofs of appropriation were sent to the holders of all such rights. In response to this, proofs were received in 189 cases. In some cases the descriptions were so faulty that personal examination was necessary, but in most of them it was fairly accurate. The proofs were put on inspection at specified places, in order that contests might be filed. Up to that time but one certificate had been issued. During the year 1900 seventy-six more were issued. These are sent to the county clerks, and by them recorded and transmitted to the owners on payment of the recording fee, which may not exceed 75 cents.

The practice of the board in adjudicating the rights of uncompleted ditches has been overruled by the supreme court. (*Farmers' Irrigation District v. Frank*, 100 NW., 286.) In these adjudications the secretary took testimony as to the plans of the appropriators and fixed the amount of the appropriation at one-seventieth of a cubic foot per second for each acre which it was proposed to irrigate. In each case, however, this clause was added:

The amount of water appropriated shall not exceed —— cubic feet per second of time; neither shall it exceed the capacity of said ditch or canal nor the least amount of water that experience may hereafter indicate as necessary for the production of crops in the exercise of good husbandry; and, further, said appropriation, under any circumstances, shall be limited to one-seventieth ($\frac{1}{70}$) of a cubic foot per second of time for each acre of land to which water is actually and usefully applied on or before —— (date fixed for completion).

The court held that the board exceeded its powers in so far as it went beyond determining the rights acquired at the time of the adju-

dication; that in going beyond this it was granting rights, which it had no power to do. From this premise the court reached the conclusion that the owner of such a canal had the right, dating from the time of beginning work as fixed in the adjudication, to the full amount to which the board had stated right would be acquired if it was put to beneficial use within the time fixed. In other words, the decision was that the board could not grant a right, but that it did grant a right which was good. Not only that, but the court declared vested rights which the board had made conditional upon the beneficial use of the water. Very few of the large canals which were uncompleted at the time of adjudication have yet been extended to water the area specified, yet under this decision they hold rights to the full amounts stated in the findings of the board unless it is proved that the rights have been abandoned. The secretary has not, however, issued certificates to the holders of such rights, and when requested to do so he merely certifies to what the records of his office show.

ACQUIREMENT OF RIGHTS.

The party wishing to acquire a right to water in Nebraska applies to the secretary of the board. The requirements for this application are as follows:

Said application shall set forth the name and post-office address of the applicant, the source from which said appropriation shall be made, the amount thereof as near as may be, location of any proposed work in connection therewith, the time required for their completion, said time to embrace the period required for the construction of the ditches thereon and the time at which the application of the water for beneficial purposes shall be made, which said time shall be limited to that required for the completion of the work when prosecuted with diligence, the purpose for which water is to be supplied, and if for irrigation a description of the land to be irrigated thereby and the amount thereof and any additional facts which may be required by the State board.

If the application is in any way defective it is returned to the applicant for correction. The secretary has the right to approve the application for a less amount of water than is applied for, for a less area of land or may limit the time for completing the work. He is required to refuse an application if there is no unappropriated water in the source of supply or if a prior appropriation has been made to water the same land or if it is deemed detrimental to the public welfare. Appeal may be had from the decision of the board to the district court. In a recent case, where it was reasonably sure that an appeal would be taken whichever way the secretary ruled, the board took up the original application before the secretary had acted on it and decided the case. Appeal was at once taken to the court. The case of Farmers' Irrigation District *v.* Frank, cited above, was also an appeal from the ruling of the board. In that case the question was whether the board could approve an application for the irrigation of land which was covered by a previously approved application, and the court held that

it could not. The language of the law is "if a prior appropriation has been made to water the same land." The question on which the case hinged was whether the securing of the approval of an application for water to irrigate a given tract of land is the "appropriation of water" for that tract. The ruling of the court is to the effect that it is. In Nebraska, as in Wyoming, there is no requirement that the applicant own the land covered by his application or that he show any agreement with the owner. The effect of this ruling is, therefore, that one person can secure the right to water the land of another, and the latter is barred from providing his land with water in any other way. The ruling in Wyoming is that a permit is not exclusive (see p. 29).

For a few years after its organization the board held that until existing rights were adjudicated it had no means of determining whether there was unappropriated water in any stream, and therefore took no action on applications other than to receive and file them. A circular letter was sent to each applicant explaining the situation and stating that if he were sure there was unappropriated water the board would not seek to prevent his proceeding with construction and that such construction should not in any way prejudice his rights. In many cases canals were built under these conditions. Since the old rights are very largely adjudicated, applications are now acted on promptly, the work being practically kept up to date.

The application blanks contain four township plats, and the location of headworks and the line of canal must be shown on these, but regular maps are not required until six months after the approval of the application. When an application is received the engineer examines the situation himself, or has some one else, usually one of the water officials, do so, and bases his approval or disapproval on this report. One case is reported where an under secretary reported that the plan was impracticable and the application was rejected.

The rejection of applications seems to be much more common in Nebraska than in the other States. The report of the secretary for 1899 and 1900 states (p. 9) that in those two years 210 applications were allowed and 126 dismissed. In the succeeding two years 74 were allowed and 17 dismissed. The right of the board to reject applications has never been passed upon by the courts. In the one case of appeal from the secretary this question was not passed upon. This right has been denied in Utah and Idaho (see pp. 53, 69), and in Wyoming is seldom exercised.

Up to September 15, 1905, there had been 800 applications approved under the law of 1895.

Rights to store water and to appropriate water for power purposes are initiated in the same way as ditch rights. There is no provision for inspection to see that work is commenced within six months after

the approval of an application, and this question would arise only in case of contest.

Before the time for the completion of works under a permit a blank "Proof of appropriation" is sent to the holder of the permit, with a circular letter stating when proof must be submitted, and giving directions as to filling the blank and making a map showing the lands irrigated.

The proof of appropriation consists in a sworn statement showing the name and address of the appropriator, when works were begun and were completed, description of works, areas irrigated the first year and in subsequent years, legal description of lands irrigated, period in each year when water is used, period when water supply is short, and the amount of the appropriator's interest in the works.

On the receipt of this sworn statement the secretary or some representative examines the works, sometimes making surveys, and reports on the case. If the proof is not contested and the works and areas irrigated are found as represented, a certificate is issued.

If no response is made when proof of appropriation and notice of expiration of time for completion of works are sent, the secretary inquires into the circumstances personally or through some of his assistants. If this examination shows a failure to comply with the approved application, the permit is canceled.

A party wishing to change his point of diversion must apply to the secretary and secure a permit before making the change. On receipt of such an application the secretary makes an examination to determine whether others will be injured by the change before the application is approved. The applications received have been mostly relocations of head gates rather than transfers of use to new locations, but this provision covers transfers as well. This puts upon the one wishing to make the transfer the whole burden of proving to the satisfaction of the secretary that the rights of others will not be injured, instead of leaving those injured to bring action to prevent the transfer.

DISTRIBUTION OF WATER.

The system of distributing water in Nebraska is similar to that in Colorado and Wyoming, except that the officials have different titles. The State is by law divided into two divisions, and the State board of irrigation has authority to divide these into districts upon petition of those interested. Each of these two divisions have been divided into six subdivisions, and five districts have been created.

The State board, through its secretary, has general authority over the distribution. Each of the divisions has an under secretary who has supervision of distribution within his division, and in each district there is an under assistant, who has immediate charge of distribution, under the direction of the secretary of the board and the under secretary of his division.

Ditch owners are required to maintain head gates and flumes to the satisfaction of the under secretary of the division, who is to serve notice on the owners when he requires their construction. If owners neglect to put them in, the under secretary is to notify the county commissioners, who are to put them in, and in case the owners neglect to repay the county the under assistant is to turn off the water. No cases have ever come up under this law. In the other States it has been found more effective to have the water turned off on the refusal of the ditch owner to put in the structures required. Any other system allows delay greatly to the advantage of the person refusing to obey the order.

Interference with a head gate which has been set by an under assistant is punishable by a fine not exceeding \$200, or imprisonment not exceeding three months. Under assistants have power to make arrests, and when one is made the under assistant making it must make complaint before the proper justice of the peace. There is no provision similar to that in Colorado and Wyoming, making the use of water from a ditch which has been closed *prima facie* evidence of having opened the gate. There have been a few arrests, and in one case the under assistant was sued for damages for having closed a gate. This case was never brought to an issue.

MISCELLANEOUS DUTIES OF SECRETARY OF BOARD.

The approval of the secretary must be had for all dams over 10 feet in height. Only a few have been submitted. There is no provision for inspection to insure the carrying out of the plans as approved.

The stream gaugings provided for by law have been carried on in cooperation with the United States Geological Survey. The Survey pays the gauge readers, and the secretary makes the gaugings. Ten regular stations are maintained on the Platte, Loup, and Republican rivers. Other gaugings are made by the secretary as he has opportunity.

Ditch owners selling water are required to maintain measuring devices made on specifications approved by the secretary of the board, but no cases have come up under this provision.

The same is true of the provision that the secretary is to determine what deductions shall be made for losses by seepage and evaporation when water is turned into a natural channel to be diverted below.

In 1905 a law was passed requiring the secretary to furnish counties with bridge plans whenever requested to do so, the cost of the plans to be charged against the county. Three thousand dollars was appropriated for this work, this fund to be a revolving fund, since expenditures are to be repaid by the counties. The secretary is having a series of standard plans made.

RECORDS OF THE STATE BOARD OF IRRIGATION.

For each right originating before the passage of the present law there is in the office of the board a bound record consisting of a copy of the original notice filed, the statement filed under the law of 1895, the testimony taken at the hearing by the secretary, and the opinion of the board allowing the claim. This opinion describes the land and the ditch and gives the acreage. There were in September, 1905, 1,015 of these records. Each of these is given a docket number, by which reference is made to the case.

Applications are recorded as they come in. If they are sent back for correction, the changes are written in on this record, but not in such a way as to show what is original and what is correction. Each application is numbered as it is received.

The main facts regarding rights of both classes are shown in books in which the adjudicated rights and the applications occur in numerical order, being indexed by names in the front of the book. The column headings indicate the nature of this record. They are as follows:

(1) Number; (2) name of stream; (3) name of claimant; (4) post-office address; (5) name of canal; (6) use to which applied; (7) second-facet applied for; (8) location of head gate, section, township, range, and county; (9) date filed; (10) date of approval; (11) date of dismissal; (12) affirmed by board, date; (13) date of priority; (14) certificate number; (15) priority number on stream; (16) priority number on watershed; (17) estimates by claimant, length, cost, and area covered; (18) date of completion of works; (19) date of completion of application of water; (20) extension of time; (21) proof of appropriation filed, date; (22) maps—case, number; (23) reports of assistants—volume, page; (24) field notes—volume, page; (25) record—volume, page; (26) relocation—volume, page.

Record is also kept by streams on sheets showing the data which is given in the applications or proofs filed.

The maps filed with the proofs and applications are indexed by the names of the owners, and the books in which all rights are kept by docket or application numbers give the number of all maps relating to those rights. There is also an index of drawers in map cases, by numbers, showing what is in each. All of these indexes of maps are in a single book. The numbers given maps show where they should be kept, so that if any map is left out of the case it can be put in its proper place without trouble. For example, the number 1 2 10 shows that the map belongs in drawer 1, compartment 2, and is the tenth map from the bottom.

The secretary is making township maps of the State on the scale of 2 inches to the mile, showing the streams and ditches and the lands irrigated by each ditch. On these maps each ditch bears its name and the docket number, if it has an adjudicated right, and the application number, if it was built under the present law.

FEES.

Until 1905 no fees were charged by the board of irrigation. In that year a law was enacted providing that fees be collected by the secretary as follows: For filing and examining application, \$2; for recording any other water-right instrument, \$1 for the first 100 words and 15 cents for each additional folio; for copying maps or plats, 40 cents per hour for the time used; for making certified copies of any documents, 15 cents per folio and \$1 for each certificate attached; for issuing certificates of appropriation, \$1. No provision as to the disposition of the funds is made, but they have been turned into the general fund of the State. When oral testimony is given at a hearing, the party in whose interest it is given must pay the stenographer 20 cents per folio. The amount of the stenographer's fees was large during the years when adjudications were being made, but these have practically ceased.

APPOINTMENT, TERMS, AND SALARIES OF OFFICIALS.

The secretary is elected by the State board of irrigation. The term is two years, and the salary \$2,000 per year. He may appoint an assistant at \$1,200 per year and other assistants at an expense not to exceed \$500 per year.

The under secretaries are elected by the board for terms of two years. They receive \$5 per day, not to exceed \$800 per year. This is paid by the State.

Under assistants are elected by the board for a term of two years. They receive \$5 per day for the time put in, paid by the county where the work is done. They can not receive more than \$500 per year.

IDAHO.

The office of State engineer was created in 1895, in connection with the acceptance of the conditions of the Carey Act. The engineer is required to examine plans submitted under that act to determine whether they are feasible and beneficial to the public; whether there is unappropriated water in the source of supply; whether he has approved a permit for the appropriation of the water to be used; whether the works planned are of sufficient capacity to properly supply the land; whether the cost of construction is reasonable; whether the maps filed comply with the regulations of the Department of the Interior and with the regulations of the State engineer's office, and whether the lands applied for are desert in character. If necessary, in order to determine any of these things, the engineer may make surveys. He reports his findings to the State land board, which has the approval of plans under the Carey Act. The construction of works

under this law is also subject to inspection by the State engineer. He is required to measure the flow of streams, locate and survey reservoir sites, and give estimates of capacity and cost. All parties wishing to build dams over 10 feet high are required to have their plans approved by the engineer, and he is also required to inspect existing dams over 20 feet high.

Since 1901 irrigation district plans also have been subject to the approval of the State engineer. The maps, estimates, and descriptions of proposed districts are submitted to the engineer sixty days before the hearings on the organization of the districts before the county commissioners. The engineer examines the plans and in some cases goes over the ground and reports to the county commissioners. If the engineer reports adversely, the matter is dropped, except that the petitioners may amend their plans in such a way as to meet the approval of the engineer. Idaho has gone further than any other State in aid of irrigation districts, paying benefits assessed on State lands included within the boundaries of such districts, and, on the other hand, it is the only State requiring that district plans be approved by any State official.

Up to 1903 the engineer had nothing to do with the acquirement of rights or the distribution of water, his duties being chiefly making general surveys of the water resources of the State and in connection with the Carey Act projects and irrigation districts. In that year an attempt was made to provide by law a complete system of public control of the water supply of the State with the State engineer at the head.

DEFINING RIGHTS.

The adjudication of rights was left with the courts, as it was before, but provision was made for the beginning of actions for adjudication of rights by water commissioners and for the making of surveys and maps by the engineer on request of the court whenever any action for the adjudication of water rights was brought. This law provided for the bringing of actions by the commissioner on streams whose waters had been partly adjudicated, but made no provision for streams where the rights were entirely undefined. The provision for the bringing of actions by the water commissioner was declared void in *Bear Lake v. Budge* (75 Pac., 615), the court holding:

Under the police power of the State the legislature can not authorize a public officer to bring a suit to settle private rights to the use of water or the priority of such rights.

The provision for the court calling upon the engineer to make surveys when actions are brought by private parties has, however, been upheld. (*Boise City Irrigation and Land Company v. Stewart*, 77 Pac., 25.) But this provision is held to be merely directory, not mandatory. The engineer has therefore no necessary connection with the adjudication.

cation of water rights, since the court may call on him for the surveys or not, in its discretion.

In two cases the court has called on the engineer for surveys—one for the settlement of rights on the Boise River and one for the settlement of rights on the upper Snake River. In each case the engineer has made the measurements and prepared maps. The maps of the Boise are on a scale of 600 feet to the inch, the canals and larger laterals and irrigated lands being mapped from surveys. The areas served by the various canals are shown in different colors, and the names of the owners of all lands are placed on the map. In addition, statements are made up showing the location and capacity of each lateral, the name of the owner of each legal subdivision of land, the crops raised, the areas irrigated, and the additional area irrigable. The statements for each canal are bound together, and on the cover the statements contained are summarized.

The cost of the surveys, maps, and statements for the Boise River was \$10,704.60, and the total area irrigated 102,505.4 acres, and the additional irrigable area under existing canals 127,421.9 acres. This makes a cost of 10.4 cents per acre irrigated or 4.7 cents per irrigable acre for which water is claimed.

The surveys on the upper Snake River covered 290,679 acres of irrigated land and an additional area of 502,501 acres of irrigable land, at a total cost of \$28,000. This is at the rate of 3.5 cents per acre for the entire area or 9.6 cents per acre irrigated. One-half the cost of the surveys on the Snake River was borne by the United States Geological Survey and one-half by the State engineer's office, the work being in charge of the engineer.

The costs of these surveys are to be assessed by the court against the parties to the adjudication pro rata. There was, however, no appropriation to cover the expense of surveys, making it necessary for some one to advance the money. In the case of the surveys already made, some of the banks of the State advanced the cost upon warrants issued by the State engineer and are holding them until the cases are settled.

The surveys and statements are filed with the court, and the question of their status as evidence has been raised. In *Boise City Irrigation and Land Company v. Stewart*, the State supreme court held:

I think it was the intent of the legislature to authorize the court to accept such evidence just the same as any other evidence is accepted and to consider it with all the other evidence in the case, and if it is shown to be correct to accept it; otherwise to give it such effect as under all the evidence the court may think it entitled to.

Judge Stewart, the defendant in this case, before whom the Boise River case is being tried, has intimated that he will not accept the surveys of the engineer as final on the acreages irrigated, where the

testimony shows that areas other than those shown on the maps as irrigated have been irrigated in previous years. It has also been held that if the maps are incorrect as to any party's canal, he can not be compelled to pay for the survey.

In the Boise River case the court has requested the engineer to make measurements of return seepage, the measurements to be used in preparing the decree. During the season of 1905 the water supply in the Boise River was very short, and the court issued a temporary decree providing that the water be divided among the canals of the valley on the basis of the acreage served by each, disregarding priorities entirely. This was acquiesced in by all parties concerned, but not without some complaint. By this means the orchards and perennial crops have been kept alive throughout the valley, and the water undoubtedly did much larger service than it would have done if priorities had been recognized. It is claimed also that the forced economy of the season of 1905 will do a great deal to promote more economical use in the future.

It is unfortunate that the provision for the foundation of any system of public control of water—a list of existing rights—is not provided for in the Idaho law. The water commissioners can not properly enforce undefined rights, and neither the engineer nor an intending irrigator can tell how much unappropriated water there is in any source of supply until the rights to that supply are adjudicated. If the principle announced by the supreme court that a State official can not bring an action for adjudication is maintained it will be impossible to provide for the complete list of rights, which is necessary for the orderly public control of the waters of the State. Adjudications will naturally take place from time to time, and rights can not now be acquired without being properly defined. There will therefore be a gradual approach to a complete list, and perhaps after many years all rights may be defined.

There is, however, provision for compiling and publishing lists of the decreed rights to the streams of the State. The clerks of the district court were required to prepare at the expense of the counties and send to the State engineer copies of all water-right decrees on file. The engineer records these in books kept for that purpose and classifies them, placing all rights to the water of one stream and its tributaries together. These classified rights are kept in a card index.

Certified copies of the allotments on each stream are furnished to the water commissioner having jurisdiction over it. The water commissioner then prepares for each stream a list of the rights, numbered in the order of their priorities, and has it printed in pamphlet form and distributed to the water users interested. These pamphlets have been prepared for the streams where decrees have been rendered.

ACQUIREMENT OF RIGHTS.

Since 1903 the engineer has had control of the acquirement of rights. Any party wishing to acquire the right to use any of the public waters of the State must make application to the engineer in proper form. This application must set forth:

(1) The name and post-office address of the applicant; (2) the source of the water supply; (3) the nature of the proposed use; (4) the location and description of the proposed ditch, channel, or other work and the amount of water to be diverted and used; (5) the time required for the completion of construction of such works, which in no case shall exceed five years from the date of approval of application; (6) the time required for the complete application of the water to the proposed use, which must be within four years after the date set for the completion of such works.

The application shall be accompanied by a plan and map in duplicate of the proposed works for the diversion and application of the water to a beneficial use, showing the character, location, and dimensions of the proposed reservoirs, dams, canals, ditches, pipe lines, and all other works proposed to be used by them in the diversion of the water and the area and location of the lands proposed to be irrigated.

When the works to be built have a capacity of less than 25 cubic feet per second the maps filed with the application may be made by the applicant, but when the capacity is more than 25 cubic feet per second they must be accompanied by a certificate of the surveyor who made them.

When an application is received the engineer indorses on it the date of its receipt and records it in a book called the "Starting book." If the point of diversion is not given or if the filing fee does not accompany the application it is not recorded and given a number. It is not then considered as having been received at all, except that it will be returned to the applicant with a statement of what is lacking. Applications which do not comply with the law or the regulations of the engineer's office are returned for correction and must be returned corrected within sixty days.

The engineer is required to approve all applications which are in proper form and which contemplate a beneficial use of the water applied for, and the application thus approved constitutes a permit. This provision relieves the engineer of a great deal of the responsibility which is placed upon engineers in other States where they are given power to reject applications if there is no unappropriated water in the source of supply, if the granting of them is contrary to public policy, or if the applicant does not show his financial ability to carry out the proposed plans, but it makes this feature of the work of the engineer of just that much less value. Where the engineer is required to reject an application if there is no unappropriated water in the proposed source of supply, his approval gives some assurance that there is water to which the applicant can secure a right, while in Idaho it means no more than that the application was in proper form, placing on the applicant the burden of finding out whether his permit is of any

value. This would seem to be a proper State function, since the individual has not the means of investigating the water supply and the existing rights, as has the State; but the law is at least consistent. As has been shown in the previous pages, there is no provision for securing a complete list of all rights to water from any stream, and without such a list neither the engineer nor the applicant can tell from the records whether there is unappropriated water in any stream. In many cases it will of course be a matter of common knowledge that a stream is or is not fully appropriated, and there may be little danger of injustice so far as the applicant is concerned. The filing of applications, however, provides a record of the time of initiating rights, since if the work is carried out in accordance with the law and the regulations the right dates from the date of filing, and the requirement of the approval of an application by the engineer before construction can begin prevents the initiation of any rights without a public record.

The works provided for in an application must be completed within five years, and the water must be applied to beneficial use within a further period of four years, but the engineer in approving an application may require that the work be done in shorter periods. One-fifth of the work must be done at the expiration of one-half of the time allowed for completion of works. Works having a capacity of less than 25 cubic feet per second must be begun within sixty days from the approval of the application, and the holder of a permit for more than 25 cubic feet per second must within sixty days of the issue of the permit file a bond, the amount of which is fixed by the engineer, not exceeding \$10,000, conditioned upon faithfully carrying to completion the works specified in the permit. There is no inspection to determine whether this has been done. Whether work is begun in proper time and carried on with proper diligence will be brought up only when some adverse claim arises, when the applicant will be required to prove compliance with the law. One such case has arisen and is still pending. The provision for filing bond conditioned on completion of the work was enacted in 1905, and there has been little opportunity to observe its workings. Its natural result will be to prevent filings for the purpose of blocking some other enterprise or for the purpose of selling worthless "rights" based only on a permit from the engineer. The requirement that duplicate maps be filed with the application will have the same effect, since it adds to the expense necessary to securing a permit. If surveys must be made, maps made in duplicate, and bonds filed, the danger of filings for any but legitimate purposes will be lessened. Another provision having the same tendency is the filing fee of \$1 for the first cubic foot per second filed on and 10 cents for each additional cubic foot per second. While 10 cents per cubic foot per second is a small fee, it is sufficient to retard the filing of applications for extravagant amounts of water.

There has been but one appeal to the courts from the rulings of the engineer on an application, and that was settled out of court. If the matter had remained in the court, the engineer would have placed the matter in the hands of the attorney-general. Most of the applications made have to be returned to the applicants for correction, and as a rule they are corrected in accordance with the suggestions of the engineer and returned. Many applicants employ attorneys to make out their papers, but as a rule these do not meet the requirements any better than the others.

Before the expiration of the time allowed for the completion of works under a permit the holder must submit proof of the completion of the works in accordance with the permit. At least sixty days before the expiration of the time allowed the holder must send to the engineer a notice that he will be prepared to submit proof of completion on a stated day, and if the works are to carry more than 50 cubic feet per second an engineer's certificate must be submitted with the notice of proof. In practice the engineer notifies the holder of the permit of the time when his works should be completed and of the time when he should notify the engineer of his readiness to submit proof. The notice to the engineer is sent on blank forms provided by the engineer and gives the date when proof will be submitted, the name and post-office address of the holder of the permit, the number of the permit, the purpose for which the water is to be used, the capacity of the works, the area of land for which the water is available for canals carrying more than 50 cubic feet per second, a certificate from an engineer that the statements made in the notice are true, and the name of the newspaper in which the permit holder wishes notice of his submitting of proof published.

Upon the receipt of such a notice the engineer orders it published for a period of four weeks in the newspaper designated by the holder of the permit, the notice to contain also the date when proof will be submitted to the engineer and the place where it will be submitted. This publication is at the expense of the applicant, and the average cost up to this time has been about \$5. The engineer has printed forms for these notices, for letters transmitting them to newspapers, and for acknowledgment of their receipt by the publishers. The permit holder may submit affidavits from two engineers as to dimensions and grade of ditch, and the State engineer may demand profiles and cross sections, and if the works are completed may order the water turned into them for the purpose of measuring it. The holder makes a sworn statement and submits depositions from two witnesses; the engineer examines the works and makes a report on their condition. So far there have been no serious differences between the statements submitted and the results of the measurements made by the engineer. When differences occur further examination is made and

agreement is reached informally. There were about fifty proofs to be taken in September, 1905, and the number is constantly increasing. Any party feeling aggrieved at the action of the engineer may appeal to the courts, but there have been no such appeals. Others than the claimants have paid very little attention to the submission of proof. If the works have been completed in accordance with the permit, the engineer issues to the permit holder a certificate of the completion of the works.

Upon the issuing of a certificate of completion the holder pays to the engineer a fee of \$5 for a canal having a capacity of 10 cubic feet per second or less; for larger canals the fee is at the rate of 30 cents for each cubic foot per second.

A similar procedure is followed for making proof of the application of the water to beneficial use, the cost of advertising being about the same. Maps are made by representatives of the engineer showing the irrigated land. There have been no contests or appeals in connection with this. When beneficial use has been proved the engineer issues to the party a license which gives the numbers of the application, the permit, and the certificate of completion, and further defines the right, as follows:

Now, therefore, by virtue of the authority vested in me by the laws of the State of Idaho, I hereby grant and confirm to _____, of _____, the holder and owner of said permit No. _____, a perpetual right, dating from _____, to the use of _____ cubic feet per second of the waters of _____, in the county of _____ and State of Idaho, or so much thereof as may be necessary for the purposes hereinbelow mentioned, to be diverted at _____ and conducted to and upon _____ for the purpose of _____, subject, however, to the laws of the State of Idaho applicable to a license for the use of the waters of the State, and subject, also, to the local or community customs, rules, and regulations which have been or may be adopted from time to time by a majority of the users from a common source of supply, canal, or lateral from which such water may be taken, when such rules and regulations have for their object the economical use of such water.

Up to September 5, 1905, twenty-two such licenses had been issued covering 2,413.9 acres, an average of 110 acres per license, showing that they were all for small works. The law has been in effect only a little more than two years, and naturally only small works have been completed.

Where a canal supplies water to others than its owners, the license is issued to the owners rather than to the landowner. A fee of \$2 for each legal subdivision of 40 acres or fraction thereof is charged for the license when the water is used for irrigation, and a fee of \$5 when the water is used for some other purpose; but when two or more users, whose lands join or who take water from a common lateral, join in submitting proof the fee is \$1 for each legal subdivision of 40 acres or fraction thereof.

The total fees for acquiring a right to water from an Idaho stream for a homestead of 160 acres are as follows:

Cost of securing water rights in Idaho.

Filing fee with application (3.2 cubic feet per second).....	\$1.30
Fee for examining works for completion	5.00
Advertising date of proving completion.....	5.00
Fee for examining land for application of water to beneficial use	8.00
Advertising date of proving beneficial use.....	5.00
	24.30

All of these fees go to the general fund of the State, as similar fees do in the other States. In some States there is a desire on the part of the engineers to have the fees retained in the engineers' offices, to allow of an extension of the work done. This is not considered very important in Idaho, however. It is felt that if the fees are large the legislature will make larger appropriations than otherwise, and the result will be the same as if the fees were retained in the office.

DISTRIBUTION OF WATER.

For the purpose of administering and controlling the public waters, the State is divided into three water divisions, and for each of these divisions there is a water commissioner appointed by the governor and confirmed by the senate. The State engineer and the three water commissioners constitute the State board of irrigation. This board makes rules in regard to making proof of completion of works and the application of water to beneficial use, and all needful rules for the distribution of water. Each commissioner must reside in his division, and has immediate direction and control of the water masters and of the distribution of the water in his division, under the general supervision of the State engineer. The commissioner is also, when requested by the engineer, to take proof of completion of works and of the application of water to beneficial use. The commissioners are to serve six years, the terms being so arranged that one will be appointed every two years. The commissioner of water division No. 3 is secretary of the board.

The board, in addition to making rules regarding making proof and distribution of water, is to divide the State into districts for the distribution of water. These districts are to be created as necessity for them arises, the first ones being made to embrace the streams whose waters had already been allotted by the courts, and others are to be created as the streams are adjudicated. Any company or association not selling or renting water may have a water master appointed by the water commissioner. Water masters are appointed by the water commissioners and serve for one year, but on adjudicated streams where the extreme points of diversion are not more than 20 miles apart the

water users may select a water master. A community having unadjudicated rights and using a stream or ditch in common may also elect a water master for their supply. Each water master is required to give bond in the sum of \$500, conditioned on the faithful performance of his duties. He is also responsible for the illegal acts of any deputies he may appoint. The commissioner may remove any water master for failure to do his work, upon complaint made to him in writing.

Water masters are required to make reports to the water commissioners as often as deemed necessary by the commissioners. These reports show: The amount of water necessary to supply all ditches, canals, and reservoirs in the district; the amount of water available for this purpose, what ditches or reservoirs are at times without sufficient water, and an estimate of the probable supply for the period before the next report. From these reports made by the water masters the water commissioner determines whether the water is being properly divided between the districts receiving water from a common supply, and if not he orders such change in the distribution as will enforce priorities regardless of district lines. The reports of the water masters are kept on file in the State engineer's office.

The water masters divide the water within their districts according to the priorities of rights, under the direction of the water commissioners. Any person who willfully changes a gate set by a water commissioner is subject to a fine not exceeding \$100, or to imprisonment not to exceed six months, or both; and the water masters and their deputies have power to make arrests for such offenses. They are also required to make complaint in writing and under oath before the proper justice of the peace against the person arrested. Up to the present time there have been no arrests for interfering with gates, although there has been some friction. It has been the policy of the water officials to get along with as little trouble as possible until the water users of the State come to realize the advantages of the enforcement of the law.

To aid in a proper distribution of the water, all appropriators are required to maintain head gates and measuring flumes in their ditches. Plans for these measuring devices are furnished by the State engineer. If the water users do not put them in after ten days' notice to do so the water commissioner is to put them in, and present his bill to the county commissioners, who, in turn, present it to the party who has failed to put in the devices. If the owner neglects for ten days to pay the bill the water commissioner is to shut off his water until the bill is paid. Little has been done under this law thus far for the same reason that arrests are not made for changing head gates. It is not considered desirable to make the law obnoxious to the water users, but rather to create a sentiment in favor of its enforcement, which is gradually being accomplished. It has been suggested that the method of col-

lecting the cost of measuring devices by the water commissioner is cumbersome. The appropriator has first ten days in which to comply with the order of the commissioner, then the commissioner puts in the measuring device. It may then be nearly three months before the bill can be presented to the county commissioners, as it is to be presented at a regular meeting and these meetings occur but once in three months. After the bill has been passed upon by the county commissioners ten days more are given before anything is done, then the water commissioner turns off the water until the bill is paid. The irrigating season will be over by that time and the turning off of the water is no hardship. There is no provision for reimbursing the water commissioner if the appropriator still refuses to pay. Under this provision the appropriator may continue to use water for a whole season after being ordered to put in a measuring device, before he can be forced to do anything. It would seem that the provision for collecting the pay of water masters might well be extended to the expense of putting in measuring devices—have the county pay the bill and tax the costs against the land served by the ditch.

COST OF ADMINISTRATION.

The salary of the State engineer is \$2,000 and is paid from the general fund of the State. The appropriation for the expenses of the office for two years, 1905–1907, was \$7,500.

The salary of the water commissioners is \$10 per day for the time actually employed, which shall not exceed one hundred and eighty days in any year. For services as a member of the State board of irrigation the commissioner is paid by the State, out of the general fund. The board holds one meeting each year, which can not exceed five days, limiting the amount which the State is to pay each water commissioner to \$50 per year. For services in supervising the distribution of water the commissioner is paid by the county where the service is rendered, from the current expense fund of the county.

Water masters receive not to exceed \$4 per day for each day actually employed, and assistant water masters not to exceed \$3 per day. The water master prepares a sworn statement of the time put in by himself and his deputies, and the volume of water, stated in cubic feet per second, he has delivered to each user each day, and describes the lands to which the water was delivered. The pay of the water masters is charged against the land receiving water in the proportion that the water received by each tract bears to the whole amount of water distributed. The statement is to show the proper apportionment of the expenses among the users and is to be filed with the auditor and recorder of the county or counties in which the water was delivered. The bill is to be paid by the county commissioners and added to the taxes on the land receiving the water. When water is

distributed to an organized canal company, the cost of distribution is taxed against the canal, and no canal is exempt from the payment of such taxes. The water commissioner's reports are made on regular blanks supplied by the State engineer's office. These show in columns the names of ditches, the priorities, the names of the owners, the descriptions of the land, the water delivered in "24-hour second-feet," the cost per twenty-four-hour second-foot, special expenses, and the total cost. The report is summarized in the following form:

Total number of days of water master, at \$— per day.....	\$.....
Total number of days of assistant water master, at \$— per day.....
Other expenses charged pro rata.....
Total cost.....
Total number of 24-hour-second-feet delivered.....
Cost per 24-hour-second-foot delivered.....

MISCELLANEOUS DUTIES OF THE ENGINEER.

Parties wishing to transfer the use of water from the land in connection with which the right was acquired to new land may do so if others are not injured by the transfer, on approval of the transfer by the engineer. He has issued a circular describing the procedure, as follows:

Under the regulations adopted by the board of irrigation, an applicant for a transfer of water or point of diversion must present his petition and affidavit upon a form which will be furnished from this office, have the same indorsed by two users of water from the same stream who are not interested in his lands or water rights and who are not related to him in any way, and reported upon by the water master of his stream. He must also, at his own expense, publish a notice (form for which will be supplied by this office) for thirty days in some newspaper published in the county where his point of diversion is located, naming a place and date where objections, if any exist, may be publicly presented against the granting of such a certificate of transfer. Proof of publication of such notice must be presented by the applicant to the officer before whom the hearing is had, at the time and place specified in the notice. If no reasonable objections are offered why the certificate of transfer should not issue, and none is known to the officer, the water commissioner or his authorized agent will certify his approval of the application, which will then be forwarded to the State engineer for his action.

Accompanying the application for transfer the applicant, if not the person or corporation to whom the water right was originally decreed or licensed, must submit an abstract of title of his water right and two (duplicate) maps showing fully and in detail the present point of diversion, course of ditch or ditches, and the lands irrigated, and setting forth the lands to which he desires to transfer the water, and any change in point of diversion or course of ditches made necessary to effect it. These maps, together with the \$1 fee prescribed by law for issuance of the certificate, must be placed in the hands of the water commissioner or his agent before or upon the day of public hearing, and the applicant will also be required to pay and discharge all costs incurred in defending his petition at such hearing.

The law allowing transfers provides that "any person owning land to which water has been made appurtenant, either by a decree of the court or under the provisions of this act, may voluntarily abandon the use of such water in whole or in part on the land which is receiving

the benefit of the same, and transfer the same to other land." This provision is not altogether clear as to what constitutes abandonment of "the use of such water in whole or in part on the land which is receiving the same." The engineer has placed the following interpretation on this clause:

If a user of water has acquired the right to a certain amount of the water of a stream through a court decree or license issued from this office and by change of crops more economical method of applying water or otherwise has reduced the amount of water needed for the proper cultivation of the lands to which the water was decreed or licensed, the laws are not clear as to whether or not the State engineer would be authorized to transfer the excess thus saved to other lands or uses. Until, however, this matter is determined by the courts, upon the advice of the board of irrigation, it has been decided to grant certificates authorizing such transfers, provided no one would be injured thereby. At the same time, until this point of law is judicially determined it is not recommended that applications be made for such transfers.

In practice, if an application for transfer comes to the engineer approved by the commissioner it is approved by the engineer. Transfers are discouraged by the engineer as much as possible. Twelve applications only had been received up to September 4, 1905.

The engineer is chairman of the State board of examining surveyors, which has charge of the examination of surveyors for license.

RECORDS OF THE ENGINEER'S OFFICE.

Applications are given numbers in the order of their receipt, and a record is made in what is called the "Starting book" showing the name and address of the applicant, the quantity of water applied for, the purpose for which the water is to be used, if for irrigation a description of the land to be irrigated, the location of the point of diversion, the date of receipt, the date of return for correction, the date of return to the office, the amount of fees paid, the amount of the bonds filed, the date of approval, and the permit number. In this book all applications are filed in the order of their receipt. There is also a name index, in which the names of applicants are kept in alphabetical order. This gives the number of the application, and when a permit is issued the number of the permit. Up to the time of the approval of the application, when it becomes a permit, all correspondence regarding it is filed under the application number; when it has been given a permit number it is all transferred to the permit number. The permanent files, containing the maps and all correspondence and other papers regarding rights, are kept under the permit numbers.

All records of rights whether defined by the courts or acquired under the new law are indexed by the source of the water supply and by the legal subdivision of the land irrigated. There is a card index for streams, one for springs, one for lakes, and a miscellaneous one which contains rights which do not come in any of the other classes.

The cards in the stream index have on the top line the name of the stream and the county, and in columns the names of the holders of the rights; for decreed rights, the volumes and pages where they are recorded and the quantities in cubic feet per second; for rights acquired under the present law, the numbers and quantities of the applications, the numbers and quantities of the permits, the numbers and quantities of the licenses; and, finally, for both classes, the month, day, and year from which each right dates. In the land index are guide cards showing the townships and ranges and a card for each section in each township. On the latter cards are columns for the descriptions of the lands, the names of the owners; the volumes and folios where the rights are recorded if decreed by a court; the application numbers, the permit numbers; the numbers, volumes, and folios where the licenses are recorded; the numbers, volumes, and folios where transfers are recorded, if there are any; the volumes of the rights in cubic feet per second, and the dates of the rights. Many of the decrees do not describe the land irrigated, but in many cases the court records show this, and the index is being made up from these where the decrees do not show it.

Licenses when issued are entered at length on the records.

A miscellaneous index includes maps filed under the Carey Act, proceedings regarding irrigation districts, and miscellaneous work of the engineer's office.

UTAH.

In the early history of the Territory of Utah there was a considerable degree of public control of the use of water for irrigation, but there came a period of indifference to this, due probably to the settlement of controversies by the church authorities. This had become so marked at the time Utah became a State (1896) that efforts to secure thorough State control of irrigation resulted only in the recognition of existing rights to water. The next year the office of State engineer was created, but he was given no control of the water supply. He was to examine and report on reservoir sites for the State board of land commissioners, submit plans and estimates for reservoirs, supervise the construction of reservoirs by the State, and examine and pass upon all other irrigation work in which the State had an interest. He was also to keep a record of stream gaugings, and inspect all dams over 10 feet high, and require repairs on those considered unsafe. However, there was in this no element of State control.

In 1901 the duties of the engineer were considerably enlarged, and the authority of the State to regulate the use of water was recognized. Provision was made for the distribution of water by commissioners appointed by the county commissioners, and the State engineer was given supervision over these and required to instruct them in the

measurement of water. With a few exceptions the boards of county commissioners failed to appoint water commissioners, and this part of the law was inoperative. The making of surveys and maps of streams and irrigated lands was also added to his duties.

In 1903 a complete system of public control was adopted. The water of the State was declared to be the property of the public, subject to existing rights, and the State engineer was given "general supervision of the waters of the State and of their measurement, apportionment, and appropriation." The law provides in detail for the defining of existing rights, the acquirement of new rights, and the distribution of water by public officials.

DEFINING RIGHTS.

The law is a composite of the Colorado and Wyoming systems, providing for adjudication on the initiative of the State and with the aid of the State, as in Wyoming, but leaving it in the courts, as in Colorado. The State engineer is to make complete hydrographic surveys of the stream to be adjudicated, and collect such other facts as will, in his judgment, aid in ascertaining existing rights. When this work is completed, it is submitted to the proper court, which, after hearings, renders a decree defining the rights to water from the stream. The law provides that such surveys shall be made on each stream in the State, beginning with those most used for irrigation. Only one such survey has been begun, but is not yet completed, and the procedure for determining rights has not, therefore, been tried. It is in outline as follows:

Before beginning the survey of a stream the engineer advertises the time and place of beginning by publication in a newspaper for fifteen days. On the completion of the survey the engineer is to file a written statement with the clerk of the district court of the county in which the stream is situated, and if it is in more than one county, in the court of any one of these counties, and that court has exclusive jurisdiction of the case. This statement is to contain the names and post-office addresses of all parties using water from the stream, so far as they are known to the engineer, and such other facts as he deems necessary. Within thirty days after the filing of this statement the clerk of the court gives notice by publication, to all parties claiming rights to water from the stream, and in writing, to all parties whose names are included in the statement filed by the engineer, that within six months from the date of first publication of this notice they must file written statements setting forth their respective claims to the use of water. The clerk is to send with the notices blank forms for the statements of claims. When returned these are to contain sworn statements, showing:

The name and post-office address of the person, corporation, or association making the claim; the nature of the use on which the claim of appropriation is based, the flow per sec-

ond of water used and the time during which it has been used each year; the name of the stream or other source from which the water is diverted; the place on such stream or source where the water is diverted, and the nature of the diverting works; the date when the first work for diverting the water was begun, and the nature of such work; the dimensions, grade, shape, and nature of the diverting channel, as originally constructed; the date when the original diverting channel was completed; the date when the water was first used, the flow per second, and the time during which the water was used the first year; the date and nature of each subsequent change made in the original diverting channel; the flow per second of the water used and the time it was used each year between each of the changes so made, and the dimensions, grade, shape, and nature of the present diverting channel; the place where and the manner in which the water was first used; the nature of each subsequent change in the place or manner of use, and the place and manner of present use, and such other facts as will clearly define the extent and nature of the appropriation claimed. If the water claimed to have been appropriated is used for irrigation the statement shall show, in addition to the above-required facts, the area of land irrigated the first year and each subsequent year; the total area at present irrigated, and its location in the section, township, and range wherein it is situated; the character of the soil and the kind of crops raised during the first year of use and the first year after each subsequent change of channel, and during the last year in which the water was applied.

If the water claimed to have been appropriated is used for developing power, the statement shall show, in addition to the above required facts, the number, size, and kind of water wheels employed; the head under which each wheel is operated; the extent of the power produced, and the purposes for which and the places where it is used, and the point where the water is returned to the natural stream.

If the water claimed to have been appropriated is used for mining the statement shall show, in addition to the above-required facts, the name of the mine and the mining district in which it is situated, the nature of the material mined, and the place where the water is returned to the natural channel of the stream.

Within six months from the expiration of the time for filing these statements the State engineer is to tabulate the facts shown by the statements, and file a copy with the clerk of the court and with the clerk of each county in which the stream lies.

Failure to file such a statement bars any party from subsequently claiming any rights, except that parties receiving no notice but by publication may apply to the court for permission to file a statement, and the court may allow this within one year from the date of first publication, if the applicant makes it appear to the satisfaction of the court that he had no actual notice in time to file the statement.

At the expiration of the six months allowed for filing statements the court may appoint a referee or referees to hear the case. All papers are turned over to them, including maps made by the State engineer, and the engineer is to give on request any information he has or copies of any records of his office.

Hearings are to be held at convenient points, notice of the times and places to be given by publication, and to each claimant fifteen days before testimony is to be taken on his claim, in the same manner as summons out of a district court. During all the time of the hearings the maps and statements furnished by the engineer are to be open to inspection. Any interested party may contest the rights of any other person. Referees have power to issue subpœnas for witnesses. All

testimony is to be stenographically reported and filed in the office of the clerk of the court. The expense of the referees and stenographer is to be met by the State.

The referee is to prepare the decree, which may be modified by the court. The decree is to set forth "the name and post-office address of the person, corporation, or association entitled to the use of the water, the quantity of water in acre-feet or the flow of water in second-feet to be used, the purpose for which the water is to be used, the time during which the water is to be used each year, the name of the stream or other source from which the water is diverted, the place on the stream or other source where the water is diverted, the priority number of the right, the date of the right, and such other matter as will fully and completely define the right of said person, corporation, or association to the use of the water."

Appeal may be taken to the supreme court of the State, but must be taken within six months. If the decree is not appealed from, or within thirty days after the final decree in case of appeal, the clerk of the court is to issue to each party a certificate of his rights, which is to be recorded in the office of the county recorder. A duplicate is to be sent by the clerk to the State engineer, and by him filed in his office. This will provide a double record of all rights—one in the office of the county recorder and one in the office of the State engineer.

As was stated, there has been no adjudication under this law. But a hydrographic survey of the Weber River system has been begun by the engineer preparatory to an adjudication. The law providing for this is general in its terms, requiring the engineer to make complete hydrographic surveys and "construct maps which shall exhibit the essential facts relating to the supply, diversion, and use of the water. * * * He shall also collect such other facts as will, in his judgment, aid in ascertaining the existing rights to the use of water and in determining the volume of the surplus or unappropriated water, if any, of each of such streams or sources." The details are left to the engineer.

In this case the work is being done on an elaborate scale. The first step was to make an examination of each ditch to determine the proper place for putting in a measuring device, and the size and kind of device best suited to each ditch. Detail drawings and bills of material for each structure were then made. The device adopted is a flume with a removable trapezoidal weir plate. The weir plate is removed during high water and replaced in low water. It is also raised whenever it is necessary to clear out the sediment which has collected behind it. The engineer and his assistants also supervised the placing of the flumes, to insure its being properly done. As there are 1,175 ditches on this river system, this involved a great deal of work. The engineer reports that these devices have been put in at least 90 per cent of the ditches.

After the weirs have been set readings are made at frequent intervals and recorded, so that at the end of a season the records of the engineer will show how much water has been used by each ditch throughout the season, when use began, and when it ceased. These records will give the court full information as to the use of water at the present time.

The location of canals and of the land irrigated is ascertained by careful instrumental survey, in which distances are determined by stadia and elevations by vertical angles. From these surveys three sets of maps are made, known as the unit maps, the diversion maps, and the division maps. A division map shows a large section of the stream system. Each unit map represents a single numbered section and shows all diverting ditches and laterals, the positions of all measuring devices, the boundaries of each individual farm, what portions of each farm are irrigated, the locations of orchards, buildings, towns, streets, roads, and other natural or cultural features. Contours are also shown. The diversion maps show each ditch system complete and give the same data. On the unit and ditch maps each farm is numbered. This farm number is recorded in a book called the "Register of rights," in which, opposite the farm number, is written the name of the owner of the water right for that farm. There is space for recording changes in ownership.

While making field surveys the engineer's assistants collect information as to the time of construction, the first use of water, and all subsequent changes. The facts collected regarding each ditch are recorded in a book called "Record of diversion No. ——." The book contains blanks for the facts required by law (see p. 63), there being a blank for the ditch as originally constructed and one for each subsequent change.

After the surveys of a ditch are completed and the information as to dates of original construction and enlargements have been brought together, a meeting of those interested is called, the facts collected are discussed, and the people come to an agreement as to what they will claim for their ditch. The records of diversions will be filed with the court when the matter comes before it.

The surveys of the Weber have not been completed. The engineer estimates that this survey will take six years and that the entire expense will be \$80,000. The area irrigated is approximately 75,000 acres, making the expense slightly more than \$1 per acre for the lands now irrigated. This is all borne by the State. This matter was fully discussed before the law was passed, and bankers and other large taxpayers said they were willing to bear their part of this expense for the sake of the general prosperity it would induce. When the matter comes before the court the fees of referees and stenographers are also to be borne by the State.

In cooperation with the Utah Agricultural Experiment Station soil surveys of the tract are also being made. The estimated cost of this is 1.25 cents per acre.

This system is much more elaborate than that adopted in any other State, and it remains to be seen whether it will be maintained in Utah. The law is general in its terms, and it is in the power of the engineer to simplify the procedure if he deems it advisable. One of the greatest drawbacks is the time consumed. If the surveys of a single stream are to occupy the time of the engineer and his assistants six years, it will take a great many years to adjudicate the rights to the streams of the State. This new law did not repeal the old law, under which in any water-right suit all parties claiming rights to the same source may be made parties to the action. It is quite likely that in the years that must elapse before the rights throughout the State are defined under the new law many will be defined in the old way. There is no provision for hydrographic surveys in such cases nor for the issuance of certificates by the court when a decree is rendered. It would seem that there might well be provision similar to that in Idaho, for the court to call on the engineer to make surveys and measurements, and by all means there should be provision for the issuance of certificates by the court. The numbering of these could be left to the engineer when they are filed with him for record.

ACQUIREMENT OF RIGHTS.

Supervision of the acquirement of rights to water was given to the State engineer in 1903. Before that there was provision for posting and filing notices, but nothing more. The new law provides that rights may be acquired under its provisions and not otherwise. The party wishing to acquire a right to water must apply to the engineer and receive a permit, and must, at the expiration of the time allowed, submit proof of completion, after which a certificate is issued stating what rights have been acquired.

The application must contain the same information as is required from a claimant whose rights are being adjudicated (see p. 63). Originally all classes were made on the same form, but there was a tendency for applicants to fill all blanks, whether they should be filled or not, producing a good deal of confusion. A form with the blanks for different uses all on one sheet, but under separate headings in large type, was next tried, but there was still a tendency to fill all blanks. Now separate forms are used for irrigation, power, and mining applications. In order to get their applications in proper shape and avoid the loss of time due to making corrections, many applicants come to the engineer's office and fill out their applications with the aid of the engineer or his assistants. No maps are required with the applications, but the place of diversion and the place of returning the water

to the stream must be tied to a government corner or mineral monument if there is one within 6 miles. When an application is received, it is recorded at once if it is accompanied by the proper fees. If the fees are not paid, no record is made, but the applicant is notified and the application is indorsed as received on the date when the fees are paid and then recorded. It is then examined to see that it contains the required facts. If it does not, it is sent back for correction or additions. If it is not corrected as required, no further proceedings are had. When the application is in proper form, the engineer at once publishes at the expense of the applicant a notice of the application. This notice must be published in a newspaper having general circulation in the river system referred to for thirty days. In addition to the description of the proposed diversion, the published notice contains the statement that "all protests against the granting of said application, stating the reasons therefor, must be made by affidavit in duplicate and filed in this office within thirty days after the completion of the publication of this notice." The expense of publication has been from \$7.50 to \$18, depending on what paper it was published in. A good many applications have been dropped at this point because of the cost of advertising.

Although protests should be in the form of affidavits, informal protests are sometimes received and recognized in case formal protest is made within a reasonable time and accompanied by the proper fee. The law passed in 1903 provided for a hearing on a protested application, but when the engineer attempted to hold such a hearing it was prohibited by order of the court, on the ground that that provision of the law was unconstitutional, because it attempted to confer judicial power on the State engineer, and under this provision the engineer claimed the power to determine rights to water. The contention of the engineer was that the applicant had as yet no right to be determined and that the hearing was simply an inquiry to learn whether there was water in the source of supply to which the applicant might acquire a right. This case was decided against the engineer and that provision of the law has been repealed. Under present practice all protests are sent to the applicant, who has an opportunity to file an answer called a "rebuttal protest," and he is requested to make this in the form of an affidavit. In some cases the protestant has been allowed to answer again. After these formal papers are all in, the engineer sometimes talks the matter over with the parties informally before making his decision. Either party may appeal to the courts from the decision of the engineer. As passed in 1903, the law empowered the engineer to reject an application when there is no unappropriated water in the proposed source of supply or when the proposed use will conflict with existing rights or threatens to prove detrimental to the public interest. The engineer refused an applica-

tion which he deemed detrimental to the public interests, and the case was appealed to the court, where the engineer was overruled. This clause of the law was repealed in 1905, but it is still the duty of the engineer to reject applications "where there is no unappropriated water in the proposed source of supply or where the proposed use will conflict with prior applications or with existing rights." This follows the Nebraska doctrine in making an approved application exclusive, since the law specifically mentions conflict with prior applications as cause for rejection. The engineer is also given authority to inquire into the financial ability of applicants and into their good faith, but there is no authority to reject an application on either of these grounds, as the engineer is required to approve all applications "made in proper form and which are not in conflict with prior applications or when the proposed use will not impair the value of existing rights."

In approving an application the engineer fixes the time at which the work must be completed, not exceeding five years from the date of approval, but he has authority to extend this time later, for good reasons. Work must be begun within six months, but there is no provision for determining whether this is done. In making final proof the applicant swears to this, however.

Final proof consists in statements by the appropriator sworn to by himself and two disinterested witnesses, and a map, profile, and drawings made on tracing linen showing:

The location with reference to the United States land surveys; the nature and extent of the completed works; the natural stream or other source from which and the place where the water is diverted; the places and manner of crossing or connecting with other works or streams; the ground and grade lines, cross sections, and dimensions of the various forms of the diverting channel; the character of the materials moved and used in construction; the several appliances employed to divert, measure, and regulate the water; the character of all structures which cross, support, or constitute the diverting channel or any part of it and such other matter as will fully and correctly delineate the work done and conform to the general rules and regulations of the State engineer's office. The map, profile, and drawings shall each be certified, under oath, by the engineer who has made the same and by the applicant whose works they represent, said certificates to be substantially of such form as the State engineer shall by general rule prescribe. No certificates of appropriation shall be issued by the State engineer before the proof of appropriation shall have been made in the manner hereinabove described and any person who shall refuse or neglect to make such proof shall be guilty of a misdemeanor.

The rules of the engineer require that the maps shall be in duplicate on tracing linen, on sheets 24 by 30 inches, on a scale of 400 feet to an inch, and if the whole can not be shown on one sheet more than one must be used. Profiles must show the ground line of the diverting channel in India ink, grade line of diverting channel in red ink, cross sections of the various forms of the channel and the dimensions thereof. Drawings must show the details of the diverting dam; details of head gate, measuring device, crossings, flumes, trestles,

bridges, and other structures, and the character of materials to be used in structures. All of these must be certified to by the engineer making them. These maps and drawings were originally required within six months after the approval of the application, but the engineer recommended the change to the present plan, because of the expense to the applicant and because some changes as construction proceeds are unavoidable, and wherever changes are made the maps and drawings made in advance do not show the completed works correctly, and what is wanted is a record of the works as built.

There is no provision for inspection of works by the engineer, although he sometimes does inspect them. The engineer does not favor compulsory examination by himself or an assistant, for the reason that this would entail an unwarranted expense for small works in remote parts of the State. This same reason has been urged against examination in other States where it is required.

Upon receiving satisfactory proof of the completion of works in accordance with an approved application, the engineer issues to the appropriator a certificate setting forth substantially the same facts as the certificate issued by the court after an adjudication (see p. 65). The certificates are issued in duplicate, one is filed in the office of the State engineer and one delivered to the appropriator, who must, within thirty days, have it recorded in the office of the county clerk of the county in which the diversion is made. Certificates issued by the court are to be in one series marked "A," and those issued by the engineer in another series marked "B."

The distinctive feature of the Utah certificates is that they define the part of each year during which the water may be used. Usually applicants state the entire year as the period during which they will use the water, but the engineer has refused to allow such applications unless it is shown that the water is to be actually used throughout the year. This limiting of rights to a part of the year has always been a part of the Utah system of water rights, and its absence in other States is coming to be one of the most serious defects in those systems. Up to September, 1905, seven certificates had been issued by the State engineer.

The total expense in fees of securing a right under the Utah law is as follows:

Fee for filing application	\$2.50
Fees for approving and recording completed application.....	2.50
Advertising.....	^a 10.00
Fee for examining maps, etc., with final proof.....	5.00
Fee for certificate of appropriation.....	1.00
Total.....	21.00

^a See p. 68.

DISTRIBUTION OF WATER.

Officials to distribute water are provided for by the law of 1903, but have not been appointed because rights have not been defined, and there is therefore no basis for distribution. A former law provided for the appointment of water commissioners by the county commissioners, and a few were appointed. The new law provides that these commissioners shall serve until superseded by officials appointed under the new law.

The engineer is to divide the State into divisions and these into districts from time to time as necessity arises. For each division there is to be a superintendent appointed by the engineer with the consent of the governor, who shall hold office during the pleasure of the engineer. For each district there is to be a supervisor appointed by the county commissioners of the county in which he serves, who is to hold office during the pleasure of the county commissioners. The supervisors are to be under the direction of the superintendents, who are, in turn, directly under the supervision of the engineer. This system brings the distribution of water directly under the control of the State engineer, and any one deeming himself injured by any act of either a superintendent or a supervisor may appeal to the engineer. The compensation of each superintendent is to be fixed by the engineer according to the work required of him; that of the supervisors is to be \$3 per day, to be paid by the county where the work is done.

Interference with a person legally apportioning water is a misdemeanor. Ditch owners are to maintain head gates and measuring devices. Plans are to be approved by the engineer, and he is to furnish specifications and bills of materials if, in his opinion, this will encourage the putting in of the structures. Failure to put in structures within thirty days after requested to do so by the engineer is a misdemeanor, but no punishment is specified. The engineer has not pushed this matter, preferring to get along with current meter measurements and the existing headworks until surveys for adjudication are made, when the structures will be put in.

MISCELLANEOUS.

Water rights pass with the transfer of land if no mention is made of the matter, but they may be reserved or may be transferred separately. Under the law of 1905 transfers must be reported to the State engineer; and if the place of diversion is changed, a map showing the change must be filed with the engineer. Failure to make such report to the engineer is a misdemeanor.

Any person wishing to build a dam more than 5 feet high in the course of a running stream, or any dam to hold water more than 10 feet high, must submit plans, drawings, and specifications to the engineer for his approval, and the engineer has authority to keep

an inspector on any dam during construction to see that it is built in accordance with the approved plans and specifications and may require any changes deemed necessary. Beginning construction before the approval of plans and specifications by the engineer, or proceeding with the work in the absence of the inspector, or failure to comply with any requirements of the engineer is a misdemeanor.

Anyone living in the vicinity of any dam may request the engineer to examine it to determine its safety. The engineer may require a deposit to cover the expense of examination. This is to be returned if the request was justified by the condition of the dam and the expense collected from the owner. There is no provision for forcing the payment if the owner refuses.

The engineer has authority to inspect any ditch or diverting works and may order any additions or alterations which he considers necessary for the security of the works, the safety of persons, or the protection of property. Failure to comply with the requirements of the engineer is a misdemeanor.

FEES.

The fees collected by the State engineer are turned over to the State treasurer. They are as follows:

For examining and approving plans and specifications for any dam, \$1 for each and every foot in height of the dam to be built; and if necessary to inspect the site where the dam is to be built, an additional charge of \$10 per day and expenses shall be made.

For inspecting any diverting works, by request, \$10 per day and expenses.

For examining and filing application to appropriate water, each, \$2.50.

For examining map, profile, and drawings that are part of the proof of appropriation, \$5.

For approving and recording completed applications, \$2.50.

For issuing certificates of appropriation, each, \$1.

For examining and filing notices of protest, each, \$2.50.

For filing any other paper, \$1.

For certified copy of any paper, per folio, 20 cents.

For blueprint copy of any map, profile, or drawing, per square foot, 10 cents.

For each certificate to copy of paper, drawing, or map, 50 cents; provided that the provisions of section 67 shall not apply to works prosecuted under the supervision of the United States Reclamation Service.

The fees collected during the year 1903-4 were as follows:

Fees received 1903-4.

For filing applications to appropriate water.....	\$602.50
For filing maps, profiles, and drawings.....	445.00
For recording applications.....	65.00
For issuing certificates.....	23.00
For filing notices of protest.....	192.50
For examining and approving plans, etc.....	215.00
For withdrawing protests.....	2.00
For filing notice of change of diversion.....	1.00
For certified copies.....	29.60

For making blueprints.....	\$32.90
For filing applications to have time extended.....	15.00
For copying records.....	15.00
Total.....	1,638.50

RECORDS OF ENGINEER'S OFFICE.

When an application is received it is recorded as received, even if it is to be returned for corrections. All corrections are then put on this record in red ink. The record book is indexed by the names of the applicants and also by names of streams, the index showing, also, the file numbers and the dates of recording. There is also a card index of names of applicants, the cards containing file numbers of applications and index numbers of maps and drawings. Maps and drawings are numbered on the decimal system.

NEVADA.

The office of State engineer in Nevada was created in 1903. In 1901 there was created a State board of irrigation, composed of the governor, the surveyor-general, and the attorney-general. In 1905 the State engineer was made a member of this board also. The first duty assigned to the State engineer was to define existing rights to water in the State of Nevada. To provide a basis for this defining of rights, all county recorders were required to furnish the engineer with copies of the claims to water rights filed in their respective counties. In 1889 a law was passed requiring all parties having claims to water from the streams of the State to file their claims with the county recorders. This law was repealed four years later; but before this repeal the owners of most of the existing rights had filed claims with the county recorders, and most of those who have acquired rights since that time have done so. Since the passage of the new law all but three counties in the State have supplied the engineer with copies of the claims. These claims furnish the engineer with a basis for beginning his adjudications.

DEFINING RIGHTS.

The engineer is required to examine the streams and the works diverting water therefrom, make measurements of the streams unless sufficient measurements are already in existence, determine the carrying capacity of the ditches and canals, examine the irrigated lands, and make approximate measurements of these lands, and make maps or plats on a scale of not less than 1 inch to the mile, showing the courses of the streams, locations of the ditches, and the legal subdivisions of land which have been irrigated or which are susceptible of irrigation from the ditches already built. In practice the engineer

has made no such measurements, except in cooperation with the United States Geological Survey. The Survey is making maps showing the location of all ditches and all irrigated lands, with the names of the owners, contour lines, and, more recently, farm buildings. Such maps have been made for the Carson, Truckee, and Walker rivers, and one is now being made for the Humboldt River. The State is to pay not to exceed one-tenth of the total cost of these surveys. Having these maps, the engineer traces new maps of the tracts belonging to each farmer. These small maps are taken to the farmers, and the engineer goes over the ground to assure the farmer that the map is correct and get his signature to it as correct. When the maps have been signed in this way, the areas of irrigated land are measured with a planimeter. After these measurements are made, the farmer is again visited and testimony is taken as to when each piece of land was first irrigated. These statements are then compared with the claims previously filed, and if there is a disagreement the matter is gone over with the owner and with his neighbors and an attempt is made to explain the difference and make the new claim correct. Dates of all extensions and enlargements of ditches are secured in the same way. All of this taking of testimony is done by personal visits to the land-owners rather than in any formal hearing. As much of the land has changed hands since it was first irrigated, the owners are not always conversant with the facts as to early use of water, and in such cases the older settlers who are still residing in the neighborhood, or sometimes those who have moved away, are called in to give testimony as to the facts. In some cases early settlers are induced to return for this particular purpose, and in other cases their testimony is secured by deposition or informal communications. The expense for this collecting of testimony is paid by the owners of the land.

All of the material collected in this way is finally summarized by the engineer and put in such shape that it can be sworn to as depositions in case of contest. The compilation of the testimony made by the engineer is printed in pamphlet form, a copy being sent to each claimant and to his attorney, if he has one, in order that all may have notice of the claims of others as well as of their own claims. Such a pamphlet was issued for the Carson River.

The claims make no mention of the quantities of water used, but give merely the acreages by legal subdivisions and the dates when they were first irrigated. No contests arose in the adjudication of the Carson, but in case they had arisen each claimant would have been required to protect his own right. The engineer would not have been responsible for this. From these claims the State engineer made up his list of rights on the Carson, the only expense to the claimants being the notary fees. Certificates were issued to the claimants, stating what rights they were found to have. The law

requires that these shall be recorded in the office of the engineer, and that one copy shall be sent to the claimant and one copy to the county recorder. The law provides for the payment of the filing fees by the State. Most of the parties claiming water to the Carson had no attorneys, and the entire expense for defining rights and securing certificates was limited to the notary fees for their sworn statements.

The decisions of the engineer may be appealed from to the courts within two years, but no such appeals have been made from the Carson decree, the only one yet made. The time for appeal has not yet expired.

The rights to Walker River are now being determined in the same way. In this case it is proposed by the engineer to prepare findings, but instead of issuing certificates on his own authority turn over his findings to the court having jurisdiction of that stream and have his decree issued as a decree of the court. There has been considerable doubt as to the constitutionality of the law providing for the defining of rights by the engineer, and the course proposed for Walker River is to avoid any danger of having the certificates declared void after they have been issued by the engineer.

ACQUIREMENT OF RIGHTS.

Up to 1905 parties wishing to acquire rights to water were required to post and file notices stating what they claimed, and no further action was ever taken on these claims. In 1905 a law was passed requiring that parties wishing to appropriate water apply to the State engineer for permission to do so. These applications are to give the name and post-office address of the applicants, the source from which the water is to be taken, the amount to be taken, the location of the proposed works, the time required for their completion, including the time required for the application of the water to a beneficial use, and if the water is to be used for irrigation a description of the land to be irrigated. These applications are to be made on forms furnished by the engineer without cost to the applicant. He may return any application for correction, but all applications if properly corrected take priority in the order of their original receipt by the State engineer. When properly filed with the State engineer, the engineer is to publish in some newspaper having a general circulation within the boundaries of the river system a notice of the application, showing by whom made, the quantity of water sought to be appropriated, the stream from which the appropriation is to be made, and at what point on the stream, the use for which it is to be appropriated, and by what means. This notice is to be published once a week for four weeks. At any time within thirty days after the completion of the publication any party interested may file with the State engineer a written protest against the granting of the application, stating the reasons therefor.

The engineer may, in his discretion, hear evidence in support of or against any application and shall then take such action thereon as he deems proper and just. Such hearings have been decided against in Utah as an exercise of judicial power by the engineer. (See p. 68.)

If there is unappropriated water in the source of supply and if appropriation is not detrimental to the public welfare, the engineer is required to approve the application. The present engineer interprets the clause allowing him to reject an application because detrimental to the public welfare as giving him but little power. He deems it the duty of the engineer to accept the applications in the order of their receipt if there is unappropriated water and the new appropriation is for a lawful use. Anyone dissatisfied with the action of the engineer may appeal to the courts within sixty days after the decision of the engineer, but until the engineer's decision is overruled by the court the party is not allowed to proceed with the construction. Within six months after an application is approved by the engineer the applicant must file a map on a scale of not less than 2 inches to the mile, showing the location of the works, source of appropriation, and, if for irrigation, the land to which the water is to be applied. On submission to the engineer of satisfactory proof that works have been built in accordance with the approved application and the water applied to the beneficial use intended, there is issued to the applicant a certificate setting forth the name of the appropriator, the date, source, purpose, and amount of the appropriation, and, if for irrigation, a description of the land to be irrigated. These certificates are to be recorded within thirty days in the county in which the point of diversion is located and also in the county where the water is to be used in books specially kept for that purpose, the fee for this recording being \$1, to be paid by the party in whose favor the certificate is issued. Between May 1, 1905, when this law went into effect, and September 5, 1905, twelve applications had been made, nearly all of these being for large and important works. But one of these had been approved September 1. The others had not yet been acted upon. The rules for submitting final proof have not yet been formulated, as there is not yet any occasion for their use.

The usual expense for publishing the notice of an application is from \$7.50 to \$10 for the four weeks required. After this publication, if no objection is made, the applications are granted.

DISTRIBUTION OF WATER.

For the distribution of water the State board of irrigation is given power to divide the State into such districts as are necessary and to appoint water commissioners for these districts. The engineer, however, has general supervision of the distribution. On the Carson River, the only one adjudicated thus far, the engineer has divided the

rights into groups by dates. The United States Geological Survey maintains gauging stations on the stream, and the engineer receives weekly records of the discharge of the river. From these he determines what rights can be supplied and distributes the water accordingly. For instance, he decides that the rights antedating 1875 can be supplied at a particular time. Among the holders of rights prior to that date priorities are not recognized, but the water is distributed to them in the manner in which, in the opinion of the engineer, it can be made to do the most good. During the season of 1905 an attempt was made to maintain all perennial crops and bring to maturity the second crop of alfalfa throughout the valley. The engineer estimates that during the season of 1905 this method of distribution saved the Carson Valley \$200,000 over a strict enforcement of priorities. It is probable that any holder of an early right might have succeeded in securing his full supply regardless of the sufferings of his neighbors had he gone into court, but with one exception no objection was made to the distribution made by the engineer. The party objecting attacked a water commissioner and was fined for resisting an officer.

The water commissioners receive \$4 per day, which is paid by the county. It is estimated that the county of Douglas will pay during the season of 1905 \$600 for distributing water to about 25,000 acres, or 2.4 cents per acre.

MISCELLANEOUS.

Parties entitled to water are required to make application to the State engineer before any transfer may be made, but in practice farmers are allowed to use the water to which they are entitled on lands other than those in connection with which the rights were acquired if others are not injured by the change. That is, if a farmer prefers to use his water on new land and let the old land lie fallow, he is allowed to do so. This is done upon the theory that the water would be used on the old land if the farmer was not allowed to use it on the new land, and it makes no difference to the holders of the other rights what land the water is used on.

It will be seen from this description of the work of the engineer that he has maintained a very close personal relation with the water users and that his work has been very largely that of a friend and adviser rather than an arbitrary official. This system has apparently worked very satisfactorily in the limited field in which it has been tried. In the nature of things the engineer can not come into such close personal relations with the people of the whole State as the irrigated area is enlarged. It is doubtful, therefore, whether the law has thus far had a fair test.

MONTANA.

While Montana has a State engineer, he has nothing to do with the control of the water supply of the State. The office was created in 1903 in connection with the acceptance of the Carey Act. The State has a Carey land act board, composed of the State engineer, the secretary of state, and the State examiner, the State engineer being chairman. His duties are to examine State lands to determine their irrigability, examine and measure the streams of the State, and serve on the State board of health. In addition to the above, all applications to the Carey land act board to reclaim land under that law are submitted to the State engineer, and he is required to examine the land applied for and determine the feasibility of its reclamation. If he approves the project, he is to cause the reservation to be made and notify the applicants of his action in the matter. The law further provides that anyone wishing a reconnaissance for a proposed Carey Act project may apply to the board, depositing the money to cover the expense, and have the examination made by the State engineer. It is further provided that parties wishing to reclaim land under the Carey Act may organize cooperative associations for the purpose of reclaiming by their own labor lands subject to reservation. For such associations the State engineer is required to investigate the proposed project, and if he finds it feasible he is to prepare the maps and data required for having the land segregated under the Carey Act and prepare the engineering plans necessary for the reclamation of the land and exercise general supervision over the carrying out of the plans. No applications for work under this provision have been made.

The Carey land act board succeeded the arid land grant commission, which was created by the original law accepting the conditions of the Carey Act. The commission has entered into contracts for the reclamation and settlement of three tracts. Work under all these was incomplete at the time of the creation of the new board, and the first work of the engineer was to examine into the condition of these three projects. One of them, at Billings, has been completed, examined by the engineer, and approved by him. The other two have been examined by him and found in very unsatisfactory condition. The board is attempting to straighten out their affairs so that work can proceed and the projects be carried out.

Aside from the examination of these three Carey Act projects, the work of the engineer's office has been confined almost exclusively to examining State lands to determine their irrigability. In some instances the work has included the making of plans for works to reclaim the lands, but at present there is no authority to reclaim any land. The plans are being made in the hope that the State will be able by showing the feasibility of plans to induce some one to take up the construction of the works to reclaim the lands.

DEFINING RIGHTS.

In Montana rights are adjudicated by the courts, on testimony of interested parties, no provision being made for hydrographic surveys or for a special form of procedure. Any interested party desiring an adjudication may apply to the court and make all parties taking water from the same source parties to the action. Rights throughout the State are not very generally adjudicated.

ACQUIREMENT OF RIGHTS.

Any person wishing to appropriate water must post a notice stating what is claimed and file a copy of the claim with the county clerk of the county in which diversion is to be made, stating the usual facts as to place, quantity, use, etc., and must prosecute work with reasonable diligence. There is no inspection or record to show whether recorded plans have been carried out, but under a law passed in 1905 anyone having completed the construction of irrigation works may, after publishing notice, have his ditch and the lands irrigated or proposed to be irrigated surveyed by a competent surveyor, and file a sworn copy of the map made from this survey with the clerk and recorder of the county. Such a map is made *prima facie* evidence of the facts shown. F. H. Ray's report to the governor shows that in 1902 there were 26,646 recorded claims to water from Montana streams, with no records to show what rights have been acquired under these filings. Very many have been abandoned, but no one knows how many. Since construction of works and use of water are necessary to the acquirement of a right, the records are of no value, except that where a claimant can show a recorded claim his right may be made to date back to the time of filing. They are thus a menace to other rights, because this adds another element of uncertainty as to when a right will be held to have been acquired when an adjudication takes place. Such filings are being made by practically all appropriators at present.

DISTRIBUTION OF WATER.

There is no provision in Montana for any State participation in the distribution of water. Where rights have been adjudicated, on request of the owners of at least one-fourth of the rights affected by the decree, the court appoints a water commissioner, whose duty it is to distribute the water decreed. Parties not included in a decree can not be interfered with by the commissioner. Each commissioner is to keep a daily record of the water delivered to each user, and submit a summarized statement of this to the court appointing him at the close of the season, together with the bill for his services. The court then assesses the expense against the various parties in proportion to the quantities of water delivered to them by the commissioner. Under

this law a number of commissioners have been appointed, but more than half of the counties report that no commissioners have been appointed. An effort was made to secure reports of commissioners to ascertain the cost of distributing water, and a few were received. The commissioner for Tenmile Creek, which supplies the city of Helena and a considerable area of farm land finished his work in 1905, on July 26, when the stream became so low that the first right—that of the city of Helena—took all the water. He submitted to the court his report showing the quantities of water received by each of the thirty-two parties having decreed rights, with his bill for \$267.85 for services rendered. The largest sum was paid by the city water company, \$75.80, while the sum assessed against one party was but 10 cents for the season, a number paying less than \$1. This is a small stream, and water was unusually low in 1905, but it illustrates the system.

A commissioner was also appointed for Prickly Pear Creek, in the same county, August 2, 1903, the decree defining the rights to that stream being issued at that time. He is to receive, according to the order of the court, \$100 per month. His report was not secured.

The following table shows the total volume of water distributed by seven other commissioners and the cost of their services per twenty-four hour inch. The commissioners kept no records of the acreages served, and the cost per acre can not be given:

Cost of distributing water in Montana.

Stream.	County.	Water delivered.	Cost per 24-hour inch.
Dempsey Creek.....	Deer Lodge.....	24-hour inch.	Cents.
Rae Treck Creek.....	do.....	115,617	.19
Mill Creek.....	Ravalli.....	283,621	.11
Horse Creek.....	do.....	16,330	.66
Fred Burr.....	do.....	5,492	1.31
Mill Creek No. 2.....	do.....	14,301	.72
Burnt Fork Creek.....	do.....	1,393	2.75
		277,322	.18

Any interested party dissatisfied with the action of a water commissioner may file a complaint with the court and have a hearing. No records of such complaints were found.

The provisions of this law have been extended to the distribution of water under ditches. On application by owners of 51 per cent of rights the court is to appoint a commissioner for a ditch. No records of such appointments were found.

NORTH DAKOTA.

In 1905 North Dakota adopted a code of water laws providing for the adjudication of existing rights and the complete public control of the water supply in the future. The office of State engineer is created,

and the engineer is given "general supervision of the waters of the State and of the measurement and appropriation thereof."

The previous law of North Dakota provided for posting and filing notices, as did the laws of other States, and the State engineer has secured from the county officers copies of all such notices. The records show nothing as to what was done under these notices, but the engineer has examined the locations covered by a number of them and found that nothing had been done under those particular ones. The early notices seem, therefore, to represent very few, if any, existing rights. This is shown also by the census of 1902, which gave the area irrigated in North Dakota as about 10,000 acres. This includes considerable areas which are flooded by natural overflow. The area which can be called irrigated is much smaller. The present law, therefore, goes into effect with very few undefined rights to stand in the way of the engineer in assuming control of the waters of the State. The engineer is empowered to make all necessary general rules and regulations to carry into effect the duties devolving upon his office.

DEFINING RIGHTS.

The engineer is to make hydrographic surveys of the streams of the State, beginning with those most used for irrigation, "obtaining and recording all available data for the determination, development, and adjudication of the water supply of the State." When the survey of any stream is finished, the engineer is to deliver a copy of the maps made to the attorney-general of the State, together with all data necessary to the determination of the rights to the stream. The attorney-general is to intervene on behalf of the State, if advised to do so by the engineer, and in any suit brought hereafter the court is to call on the engineer to make hydrographic surveys.

When a decree is rendered, two certified copies are to be made, one to be filed in the office of the State engineer and one in the office of the water commissioner of the division in which the stream is situated.

The costs of the hydrographic surveys are to be assessed against the parties to the adjudication, but \$2,000 is appropriated for advancing these costs. This is to be a permanent revolving fund. No adjudications have been begun and probably will not be for some time. A few streams in the northwestern part of the State are beginning to be overappropriated, and surveys and adjudications may be made there in a few years.

As no adjudications are under way, the engineer has not determined what he will include in "all data necessary to the determination of the rights."

ACQUIREMENT OF RIGHTS.

Any person, association, or corporation wishing to appropriate water must make application to the State engineer for a permit to do so, in the form prescribed by the State engineer, giving "the data necessary for the proper description and limitation of the right applied for, as also the amount of water applied for and the periods of annual use, together with such information, maps, field notes, plans, and specifications as may be necessary to show the method and practicability of the construction and the ability of the applicant to complete the same." The engineer may send them back for correction and further information. The applicant must publish notice of his application, giving the essential facts as to the proposed appropriation, and submit proof of publication. Upon receipt of proof of publication, the engineer is to determine from the testimony of the interested parties, such surveys as are available, and the records of his office, whether there is unappropriated water in the stream. If there is, and the approval of the application is not contrary to the public interests, the engineer is to approve it. Any applicant dissatisfied with the action of the engineer may appeal to the district court of the county in which the proposed place of diversion or storage is situated. The approved application must state the time required to complete works, and if after approval of application one-fifth of work is not done in one-half of the time allowed, the engineer may accept and approve an application from some one else for same water, and the original applicant will thus lose his priority. But the engineer may extend the time allowed the original applicant to such an extent as construction has been prevented by the operation of law.

On the date set for the completion of the works or sooner, on receipt of request of the appropriator, the engineer is to cause the work to be inspected. If it is not satisfactorily completed the engineer may require changes, granting not to exceed six months for this. If it is satisfactorily completed, the engineer is to issue a certificate "setting forth the actual capacity of the works, and making such limitations upon the right as shall be warranted by the condition of the works, but in no manner extending the rights described in the permit."

Upon the date set for the application of the water to a beneficial use the engineer is to examine the works and issue a license to appropriate water to the extent and under the conditions of the actual application thereof to a beneficial use, but in no manner extending the rights described in the permit. The engineer may extend the time for completing works not to exceed three years, and for applying water not to exceed two years, "but only on account of physical or engineering difficulties which could not have been reasonably anticipated, or by operation of law beyond the power of applicant to avoid."

Only one or two applications have been made thus far and these have passed through only the preliminary stages. The engineer has prepared blank forms of applications, proofs of publication, etc., but it is not expected that any works will come to the stage where proofs of completion or of the application of water to a beneficial use will be submitted for some time, and forms for such proofs and for the license have not been prepared.

DISTRIBUTION OF WATER.

The State is divided into four divisions, and for each division the governor may appoint a water commissioner, who is to have supervision of the distribution of the water within his division according to the licenses issued by the State engineer or the adjudications made by the courts. No water commissioners have yet been appointed, as there is nothing for them to do. The four water commissioners and the State engineer constitute the board of water commissioners, which has "general supervision of the apportionment of the waters of the State."

Divisions may be divided into districts, as the necessity arises, and watermasters may be appointed by the water commissioner on approval by the State engineer. Water commissioners are to have immediate charge of distribution of water in their respective districts, and may appoint assistants. Water commissioners are to receive \$10 per day, not to exceed two hundred days in one year, paid by the State. Water masters are to receive \$4 per day, to be paid by the counties, but collected by them from the ditch owners, in proportion to the work done "as to each ditch and water right." The engineer receives a salary of \$2,500 per year.

FEES.

The fees collected by the engineer are turned into the State treasury. The fees allowed are as follows:

Examining application with maps, etc., \$5; recording permit, certificate, etc., \$1 for first 100 words and 15 cents for each additional 100 words; filing any other paper, \$1; issuing certificates of construction or license, \$1 each; making copy of any document, 15 cents for each 100 words; blueprints, 10 cents per square foot; copy of drawings, cost of making; certifying to copies, \$1.

For examining and approving in connection with water right applications, plans, and specifications for any dam, not exceeding 10 feet in extreme height from the foundation, \$10; for a dam higher than 10 feet and not exceeding 30 feet, \$20; for a dam higher than 30 feet and not exceeding 50 feet, \$30; for a dam higher than 50 feet, \$50; or for a canal, or other water conduit of an estimated capacity exceeding 50 and not more than 100 cubic feet per second, \$20; for an estimated capacity exceeding 100 cubic feet per second, \$30.

For inspecting dam sites and construction work when required by law, or when necessary in the judgment of the State engineer, \$10 per day and actual and necessary traveling expenses. The fees for any inspection deemed necessary by the State engineer and not paid on demand shall be a lien on any land or other property of the owner of the works, and may be recovered by the State engineer in any court of competent jurisdiction.

Rating ditches or inspecting plans and specifications of works for the diversion, storage, and carriage of water, at the request of private parties, not in connection with an applica-

tion for right to appropriate water, actual cost and expenses; and the State engineer shall attach his approval to such plans and specifications if found satisfactory.

The work of the engineer thus far has been very largely one of exploration to determine what development by irrigation is possible, and to become acquainted with conditions throughout the State. He is working in cooperation with the Irrigation and Drainage Investigations of the United States Department of Agriculture in making surveys for drainage works in the Red River Valley. He is cooperating with the Forest Service of the United States Department of Agriculture in determining the relation of the forests of the State to the water supply of streams; with the Bureau of Plant Industry in experimenting with various kinds of willows, as protection to the banks of streams, helping to make their channels permanent; and with the Reclamation Service of the Interior Department, in determining the feasibility of projects to be undertaken under the provisions of the reclamation law.

The irrigation law provides that the engineer cooperate with county commissioners in the engineering work required to lay out and construct drains. This is being done in cooperation between the Irrigation and Drainage Investigations of the United States Department of Agriculture, the State engineer, and the counties interested.

The engineer is also charged with fixing rates for the sale of water.

OREGON.

The office of the State engineer was created in 1905, but he was given little control of the waters of the State, his duties being confined almost entirely to making hydrographic and topographic surveys in the State. There was appropriated \$2,500 for hydrographic surveys and \$2,500 for topographic surveys, both contingent upon the setting apart of equal sums for similar work by the General Government. The United States Geological Survey has supplied these funds, and the State engineer is the resident hydrographer of the Survey. Gaugings of the various streams of the State and topographic surveys of the irrigable lands are being made under this provision.

DEFINING RIGHTS.

Whenever the Reclamation Service wishes to begin the building of works on any stream of the State the Secretary of the Interior may notify the State engineer, and he must then make surveys of the stream and the ditches taking water from it and the land irrigated. When these surveys are completed, the results are to be filed with the attorney-general of the State, who, at the request of the Secretary of the Interior, is to bring suit on behalf of the State for the determination of water rights on the stream. The validity of this provision has not been tested. In view of the fact that the provision for the beginning of adjudications by State officials has been overruled in

Idaho (see p. 50), it is doubtful whether it will stand in Oregon. There is no claim that the water belongs to the State on which to base the proceeding.

Whenever any suit for the determination of water rights is brought and the State is a party to the suit, the court may call on the State engineer to make surveys similar to those referred to above. These surveys are to include complete hydrographic surveys of the entire stream system to determine the amount of water used by each claimant, the character of the land watered, and the duty of water for each tract, and the collection of all data necessary for the adjudication of the rights involved.

Such a suit has been begun on the Walla Walla River at Pendleton. No provision is made by law for paying expenses of the surveys to be made by the State engineer, his interpretation of the law being that the \$2,500 appropriated for hydrographic surveys can not be used for this purpose, but must be devoted to general hydrographic surveys. The cost of surveys made in connection with suits is to be taxed against the parties, but the parties in the Walla Walla suit have made up a fund to pay for the surveys. The engineer has established stations to obtain complete records of stream and canal flow, is surveying and mapping all the ditches and irrigated lands, showing on his maps the character of the soil and character of the crops. He is required to make an estimate of the duty of water for each tract, and the surveys will contain the information on which he must base his estimates of duty. The law requires that the engineer shall "gather all data necessary for the adjudication of all rights involved." This he has interpreted to mean simply the information which can be secured by the making of surveys, but does not include any taking of testimony as to dates of construction of works and the use of water.

The suit on the Walla Walla just referred to is the only one which has been brought to which the State has been made a party. It will be noticed that this provision for surveys by the engineer applies only to actions to which the State is a party. In the Walla Walla case the State is made a party on the following grounds:

That the State of Oregon owns lands on the tributaries of the Walla Walla River, holds mortgages on lands situated upon said river, and claims and asserts an interest in all surplus waters of said stream, and the right to control the same, during seasons of the year when there may be a surplus in said streams, which right is asserted under and by virtue of an act of the legislative assembly of the State of Oregon, approved and filed in the office of the secretary of state February 22, 1905, and for that reason is made a defendant herein.

There is no provision for the beginning of an adjudication by the State on its own motion.

ACQUIREMENT OF RIGHTS.

Parties wishing to acquire rights to the streams of Oregon hereafter must file copies of their claims with the State engineer, but he is required simply to make a record of these filings. About fifteen such filings have been made since the law went into effect. Whenever the Reclamation Service wishes to investigate the feasibility of using the water of any streams in Oregon it is to file notice of this fact with the State engineer, after which no adverse rights to water filed on by the Reclamation Service can be acquired during a period of three years, at the end of which time the Reclamation Service must file plans for the use of the water or it is again open to appropriation. With these filings, as with those made by private parties, the engineer has nothing to do but record them. The Reclamation Service is also to file with the engineer releases of water previously filed on in case its projects are abandoned.

The engineer has nothing to do with the distribution of water. The constitution of the State gives the legislature the right to enact laws providing for this, but the legislature has as yet made no provision for it. It is proposed to have the sheriff enforce the decree on the Walla Walla when it is made. The stream, so far as it lies in Oregon, is entirely within Umatilla County, and therefore no complications would arise from having the water distributed by the sheriff. The stream, however, flows into Washington, and complications with the people in the latter State might arise.

SOUTH DAKOTA.

The office of State engineer of irrigation was created in South Dakota in 1890. The duties of the office were to make general investigations of the artesian supply in the State and confer with manufacturers of well-drilling machinery and transportation companies, with a view to securing such machinery at the least possible cost. A later law provided for the location of artesian wells by the engineer on application of the residents of any township and for inspection of the completed wells by the engineer. The office was abolished in 1897 and provision made for an instructor in the State agricultural college, who should perform the duties of the engineer without expense to the State.

The matter stood in this way until 1905, when a general law was passed creating the office of State engineer and providing for the adjudication of existing rights, requirements of new rights according to the Wyoming system, and for the distribution of water by State officials. Water from all sources not navigable is declared to be the property of the public and subject to appropriation for beneficial use. The engineer is to be appointed by the governor and confirmed by the senate, to hold office for six years and receive a salary of \$2,000 per

year. "He is to have the general supervision of the waters of the State and of the measurements and appropriation thereof, including the duties of locating surveys and making estimates of the cost of drainage canals and ditches within the State to carry off the surplus waters caused by the overflow of rivers, or otherwise preventing malarial diseases and damage to growing crops." However, no appropriation was made for the carrying out of the provisions of the law, and it has therefore been inoperative.^a

DEFINING RIGHTS.

The State engineer is to make hydrographic surveys of each source of water supply in the State and collect and record all available data for the determination, development, and adjudication of the water supply of the State. Upon the completion of the hydrographic survey of any stream system he is to deliver copies of all data necessary for determination of the rights to the use of the waters from that system to the attorney-general of the State, who shall, within sixty days, bring suit for the determination of all rights to the use of the stream. However, if suit has been begun by private parties he need not bring another action, but shall intervene in such suit if notified by the engineer to do so.

In any suit for the determination of water rights, all who claim rights to the same source may be made parties, and the court is to call upon the State engineer to furnish complete hydrographic surveys and obtain all data necessary to the determination of the rights. The costs of the suit, including all work done by the State engineer, are to be charged to the parties in proportion to the amounts of water allotted to them. For the purpose of meeting these expenses an appropriation of \$500 was made, to be returned to the State treasury when collected from the parties. Upon the completion of an adjudication the clerk of the court is to make two certified copies of the decree, one to be filed in the office of the State engineer and the other in the office of the water commissioner in the water division in which the stream is situated. The decrees shall in every case declare the priority, amount, purpose, place of use, and if for irrigation the specific tracts of land to which the rights shall be appurtenant, together with such other conditions as may be deemed necessary to define the right and its priority.

ACQUIREMENT OF RIGHTS.

Any party hereafter wishing to acquire a right to use water must make application to the State engineer for a permit, giving all the data necessary for the proper description and limitations of the rights

^a Since this was written an engineer has been appointed. He has prepared forms for applications for permits, and is making a general reconnaissance of the State.

applied for, together with such maps, plans, and specifications as are necessary to show the method and practicability of the construction and the ability of the applicant to complete the same. These maps, plans, and specifications are to be filed in duplicate, one copy to be retained in the office of State engineer and the other returned to the applicant. The applications may be returned for corrections or additions if defective in form or unsatisfactory as to the plan. Notice of application must be published at the expense of the applicant, and interested parties may be heard for or against the granting of the application. The engineer may reject applications if there is no unappropriated water in the source of supply, or if, in his opinion, their approval would be contrary to public interests; but any applicant may appeal from this decision to the court.

An approved application becomes a permit, and in his approval the engineer must state the time within which the construction shall be completed, not exceeding five years, and the time within which the water shall be applied to a beneficial use, not exceeding four years after the date of completion. One-fifth of the work must be done within half of the time allowed, and in case of failure the engineer may issue other permits for the same supply.

On or before the date set for completion the engineer is to inspect the works to determine their capacity, safety, and efficiency. He may require necessary changes and shall not issue his certificate of completion until such changes are made. When the works are in satisfactory condition, the State engineer shall issue a certificate of construction, setting forth the capacity of the works and such limitations upon the right as are warranted by the condition of the works, but in no manner exceeding the rights described in the permit.

On or before the date set for the application of water to a beneficial use the engineer shall again inspect the works, and after the inspection issue a license to appropriate water to the extent of the actual application thereof to a beneficial use. The inspection for the completion of the works and that for the application of water to a beneficial use may be made at the same time if the owner of the permit wishes this to be done. Any permit or license to appropriate water may be assigned, but no assignment is binding except upon the parties thereto unless it is filed in the office of the State engineer.

DISTRIBUTION OF WATER.

For the distribution of water the State is divided into three divisions, for each of which there is to be a water commissioner. These commissioners and the State engineer form the State board of water commissioners, which is to have general supervision of the distribution of water. The engineer may make rules governing distribution, but these may be revised by the board of water commissioners. The

divisions may be divided into districts as it becomes necessary to the economical and satisfactory division of the water. Anyone may appeal from any act or decision of a water commissioner to the State engineer, from whom appeal may be had to the courts. Water commissioners are to be appointed by the governor to serve six years, subject to removal by the governor, and receive \$5 per day for the time actually engaged in official duties, but not exceeding 100 days in any one year. This is to be paid by the State.

Ditch owners are required to put in head gates and measuring devices of designs approved by the State engineer at places determined by them, and in case these structures are not put in within twenty days after notice from the engineer the water commissioner is to refuse to deliver water to the ditch. Taking water under these circumstances is made a misdemeanor. Interfering with any dam, head gate, weir, or other structure or with any person lawfully distributing water is also a misdemeanor. These acts are punishable by fine of not more than \$100 nor less than \$20, or imprisonment for not more than thirty days, or both fine and imprisonment.

MISCELLANEOUS.

Water rights are made appurtenant to land, except that when it becomes impracticable or uneconomical to use the water upon the land in connection with which the right was acquired it may be transferred to other land, provided this can be done without injury to other rights, but this can be done only upon application to the engineer and publication of a notice of the intended transfer for four weeks in a newspaper of general circulation in the stream system in which the land is located. Upon receipt of proof of publication the State engineer shall render his decision regarding the transfer, and his decision is final unless appealed from to the court.

The State engineer may inspect any irrigation works which he deems unsafe and order such changes as may be necessary to render them safe, and must make such inspection on the application of any party who puts up the estimated cost of the inspection. He may also inspect works under construction and order any changes necessary to secure safety. The fees for such inspection are a lien upon the property of the owner, and the use of any works declared unsafe is a misdemeanor.

The engineer is to fix rates for carrying and delivering water where canals supply water to the lands of others than the owners of the canals.

Where natural channels are used for conveying water the engineer is to determine what deductions shall be made for losses by seepage and evaporation.

FEES

The engineer is to collect in advance and pay into the State treasury the following fees:

For filing and examining an application for permit to appropriate water, and map of the same, \$5. For recording any permit, certificate of construction, or license issued or any other water-right instrument, \$1 for the first hundred words and 15 cents for each additional hundred words or fraction thereof. For filing any other paper, \$1. For issuing certificates of construction or license to appropriate water, \$1 each. For making copy of any document recorded or filed in his office, 15 cents for each hundred words or fraction thereof. For blueprint copy of any map or drawing, 10 cents per square foot or fraction thereof. For other copies of drawings, actual cost of the work. For certifying to such copies, \$1 for each certificate. For examining and approving plans and specification for any dam not exceeding 10 feet in extreme height from the foundation, \$10. For a dam higher than 10 feet and not exceeding 30 feet, \$20. For a dam higher than 30 feet and not exceeding 50 feet, \$30. For a dam higher than 50 feet, \$50. For inspecting dam sites and construction work when required by law, or when necessary in the judgment of the State engineer, \$10 per day and actual and necessary traveling expenses. The fees for any inspection deemed necessary by the State engineer, and not paid on demand, shall be a lien on any land or other property of the owner of the works, and may be recovered by the State engineer in any court of competent jurisdiction. For such other work as may be required of his office, the fees provided by law.

OKLAHOMA.

Oklahoma in 1905 adopted a code of water laws similar to those of North and South Dakota. This provides for the bringing of suits for the determination of water rights by the attorney-general of the Territory after hydrographic surveys have been made by the Territorial engineer, for the intervention of the Territory in suits brought by private parties to determine water rights, and for the making of hydrographic surveys by the Territorial engineer upon the order of any court which is adjudicating water rights.

Rights are to be acquired by application to the Territorial engineer, who has authority to refuse them upon the ground of hostility to the public interests or an insufficient supply.

The water is to be distributed under the supervision of the Territorial engineer by commissioners appointed by the governor. The law makes no provision for the appointment of a Territorial engineer at the present time, but provides that until such appointment is made the secretary of the board of agriculture shall do the work of the engineer.

NEW MEXICO.

The office of Territorial engineer was created in New Mexico in 1905, but, as in South Dakota, no appropriations were made for salary and expenses, and the law has not been put into effect. It provides merely for the adjudication of existing rights, and follows the Wyoming system exactly (see p. 20). The board of control is composed of the Territorial engineer and six water commissioners. The Territory is

divided into six divisions, for each of which there is one commissioner. When a stream is to be adjudicated the commissioner for the district in which it is located collects the testimony as to dates of appropriation, etc. The Territorial engineer makes surveys; the testimony is open to inspection; protests are allowed and heard, and all the evidence collected, and the maps made are submitted to the board at the next meeting, when the rights are defined by the board and certificates issued. This law provides that all the natural waters within the limits of New Mexico belong to the public and no person shall be denied the right to appropriate said waters for beneficial use. This is similar to the provision of the Colorado constitution, which has been held by many to prohibit the State from prescribing the manner of making such appropriations and from giving the engineer or any other official authority to reject any application for permission to appropriate water on the ground of there being no unappropriated water in the source of supply or for any other reason. This point has never been squarely decided by the Colorado supreme court, but the opinion above cited is very generally accepted in Colorado. If this view is correct, rights must be acquired without public supervision until this provision of the law is repealed.

Parties wishing to construct dams must submit plans to the Territorial engineer. For large works he may require excavations to determine the character of the foundations and may visit the location of such works before giving his approval, and no rights may be acquired if such works are built without the approval of the engineer. He has authority to inspect any dam within the Territory of New Mexico, and if he finds it in an unsafe condition he may order such repairs as he deems necessary. If the owner refuses to make the repairs ordered, the engineer reports the case to the judge of the district court, who may order the sheriff to draw off the water from the dam and keep it drawn off until the repairs are made.

GENERAL DISCUSSION.

As was stated in the introduction to this report, the primary purpose of the creation of the office of State engineer in irrigated States is the distribution of the water to those entitled to its use. The engineers in the various States have other duties, but these are incidental. A first requisite for this distribution is well-defined rights. Without this the engineer has no basis on which to distribute water. Notwithstanding this, the great body of rights in the United States were acquired without such supervision as would definitely limit and define them. Because of this fact the first step in providing for the distribution of water has been the provision of a method for defining existing rights. The second step is a provision for the acquirement of rights under such public supervision as will insure a complete list of those

rights. The essential things are that the list must be complete and that the rights must be accurately defined. In so far as they fall short of this the basis for distribution is faulty. The laws of the various States providing for the defining and acquiring of rights must be judged by this standard—do they provide for a complete and accurate list of all rights to water?

The first laws looking to the provision of a list of rights were those regarding the filing of copies of notices of claims with the county officials. Such laws have been in existence in practically all of the States. These have notoriously failed of their purpose, for the reason that there was no limitation on what could be claimed and no record of what was done by the claimant after the claim was filed. It has always been a fundamental principle of irrigation law that a right to water could be acquired only by diverting and using the water. A record of claims, therefore, has no value as a record of rights. Up to the present time no other provision for securing a record of rights as they are acquired has been made in California, Montana, and Washington, except that in Montana a person having completed irrigation works may file with the county a map and statement showing what has been done.

A second step was a provision for the filing of claims with the State engineer, as well as with the county officials, the purpose being to have in one place a complete record of all claims within the State. This provision has also failed. This is the present system in Colorado and Oregon. Under these laws there was no provision for determining what rights had been acquired, the rights remaining undefined until they were brought before the courts in suits between rival claimants to the same source. In such suits only the rights of the parties to the suits would be defined, the complete defining of the rights of all parties on a single stream under this system requiring an infinite number of suits. To prevent this most of the States have since adopted a provision that in any suit regarding water rights all persons claiming rights to water from the same source may be made parties to the action. Colorado has gone further and provided a special procedure to be followed by the courts for defining rights. This system avoids the multiplicity of suits, but it makes no provision for a complete list of rights, as no adjudication will take place until conflict has arisen. While this is a serious defect this system has been criticised more severely on the ground of inaccuracy in defining rights. This has been especially true of the operation of the law in Colorado. In that State there is no provision for expert advice as to capacity of ditches, which is usually determined from the testimony of the interested parties. This has resulted in decrees confirming to claimants rights to many times as much water as they had ever used or their ditches would carry, and these decrees have been the source of some

of the most serious difficulties which have arisen in irrigated districts in Colorado.

As a direct result of the inaccuracy of this Colorado system of defining rights, Wyoming adopted its system under which rights are determined very largely by administrative officers on data secured by surveys and measurements made by experts, and rights are limited not by the capacities of the works, but by the needs of the lands watered. In this way greater accuracy has been secured, but from the standpoint of the officer charged with the distribution of water the greater advantage of the Wyoming system is that under it it is possible to secure a complete list of all existing rights. The board of control which defines rights is not compelled to wait until conflicts have arisen, but as soon as its means will permit may make the measurements and collect the data for determining the rights on any stream and make its order defining them. If funds had been provided it would have been possible within a very few years, under the Wyoming law, to define all the rights within the State, but funds have been limited, and after sixteen years there are still many undefined rights in Wyoming. This system has been copied with slight modifications in Nebraska, Nevada, and New Mexico. In Nebraska and Nevada the process was simplified by leaving to the board of irrigation the procedure under which rights are defined. In both these States it has been left to one man, the State engineer, to make the surveys, collect the testimony, and define the rights, reserving, in Nebraska, the right of appeal to the State board and later to the courts, and in Nevada to the courts. In Nebraska this resulted in the complete defining of existing rights within a very few years. The Nevada law has been in effect but three years, but the determination of rights there is much more rapid than in Wyoming.

In the other States it is very generally held that the determination of rights is a judicial matter, and can not therefore be delegated to an administrative officer. In those States there has been an attempt to secure the advantages of the Wyoming system and still leave the matter in the courts, provision being made for surveys by the State engineer whenever suits regarding water rights are begun. This provision has been adopted in Idaho, where, however, it is discretionary with the court whether the engineer will be called in, and in Utah, Oregon, North and South Dakota, and Oklahoma. But these laws are of so recent date that their efficiency has not been tested. For the sake of providing a complete list of rights where their defining is left in the courts, the State engineer or some subordinate has been authorized to begin actions after making such surveys and measurements as are necessary. This provision has been adopted in Idaho, Utah, North and South Dakota, and Oklahoma. The only State where this system has been tested is Idaho, where it was declared void,

because the official authorized to bring action was held not a party in interest and therefore not competent to bring an action for the defining of rights. In Utah the engineer has begun surveys and the collection of data preparatory to beginning an action in the court, but has not proceeded far enough for the law to be ruled upon by the court. In the other States the laws have not yet become effective. There is a difference in detail in these States, which, however, does not seem to affect the main question on which the Idaho law was declared void. In Utah the engineer is to submit the data collected to the clerk of the court in some one of the counties in which the stream lies, while in the other States the data is to be turned over to the attorney-general, who is then to begin an action in the name of the State.

It appears, then, from a study of the operation of the laws for defining water rights in the various States that so far the only effective means of securing a complete list is to have the work done by an administrative board or official, subject to review by the courts. The provision contained in the newer laws for the bringing of actions by the attorney-general in the name of the State may prove effective, but it seems doubtful in view of the decision against the Idaho law.

In the States which have provided a system for supervising the acquirement of rights the necessity for adjudicating existing rights will in a few years pass away, since all new rights will be defined as they are acquired, and, naturally, the time will soon come when all rights acquired before the passage of the laws providing for supervision of the acquirement of rights will have been defined. In the States where rights are still acquired by appropriation the necessity for a system of defining rights will continue to exist.

The essentials of a system of controlling the acquirement of rights are the same as those for defining rights—accuracy and completeness. The system adopted for securing a complete record are in general similar in the States which have adopted any system. There must be an application to the State engineer, stating the intentions of the applicant and describing the works to be built, approval of this application by the State engineer, and submission of proof of having complied with the conditions of the approved application. For completeness this is all that is essential, and some States stop with this. Colorado, for instance, requires the engineer to approve any filing which contains a clear statement of what is claimed, while Idaho requires the engineer to approve any application which is made in proper form. Colorado, however, has no provision for inspection or proof of completion, and its requirement of filings by those wishing to appropriate water is of no value from the standpoint of furnishing a list of rights.

For accuracy most of the States require an examination of the plans submitted with the application and surveys or examinations of the completed works, and, in some States, of the land irrigated, in order

that rights may be limited to the quantities of water which have been put to a beneficial use. Utah allows, instead of this examination, sworn statements by the applicant and two disinterested parties, although the engineer may make examinations if he deems it necessary. A compulsory examination by the engineer has its drawbacks. When the works are small or situated in remote districts the expense for examination is greater than is justified by the value of the rights. It has, therefore, been recommended in some States where examination is required that the engineer be allowed to accept sworn statements for remote and unimportant works, as is done in Utah. North and South Dakota and Oklahoma accept certificates of competent engineers for small works.

The engineers in several of the States have been given authority to reject applications for various causes. It should be noted that such authority is not necessary for the accomplishment of the main purposes of public supervision of the acquirement of rights. Both accuracy and completeness can be secured without this authority for rejection. It must be based, therefore, on reasons of policy outside of the main purpose of the law. The most common cause for rejection is the fact that there is no unappropriated water in the source of supply. It is an apparent absurdity to require the engineer to approve an application for the diversion of water from a stream which contains no water to which a right can be acquired. But there is something to be said in favor of approving application on streams which are already fully appropriated. The flow of a stream is not fixed, but increases and decreases from year to year, the flow in the latter part of the season almost universally increasing as the lands along its banks are irrigated, while the water requirements of land under irrigation have a tendency to decrease. The engineer is not, therefore, in a position to state that there is at any time no unappropriated water in a stream to which rights can be acquired. Decrease in use under existing rights, increase in flow due to seepage, and occasional supplies from unusually high floods may at any time furnish some supply for a new ditch. The Wyoming practice in regard to the rejection of applications upon this ground seems to be better than the Idaho practice. In Idaho the engineer approves all applications which are in proper form, making no reference to the supply which may be secured, while in Wyoming the engineer approves such an application, but stamps across the face of it a statement warning the applicant that the stream is very largely appropriated; that there is doubt as to his being able to secure any water, and that he must not interfere with existing rights. This system gives warning to the applicant, but at the same time allows him to proceed with construction if he thinks the chance of securing water is great enough to justify him in building works. If the works are built he will be in a position to take advantage of any supply which

may become available on account of more economical use, return seepage, or wet seasons.

Most of the States give the engineer authority to inquire into the feasibility of the project and the conformity of the plans to correct engineering principles. This is justified as a protection to property, and is a desirable exercise of public supervision.

The engineers are also given authority to inquire into the financial ability and good faith of applicants. With the exception of Idaho none of the States goes into any detail on this matter. Idaho requires the filing of a bond as a guaranty of good faith. Without such inquiry by the engineer or the filing of a bond as required in Idaho, it is possible for the parties having no means for carrying out works or those wishing merely to delay or hold up some legitimate project to file applications which are purely speculative, without any intention or ability to build works. The protection of the State's resources makes it essential that there should be some such check upon speculative filings. The Idaho requirements for the filing of a bond and payment of a filing fee of 10 cents for each cubic foot per second after the first seem to be preferable to general authority for the State engineer to inquire into the financial ability and good faith of the applicant, since the exercise of this authority by the engineer subjects him to charges of favoritism, and leads to ill feeling on the part of those whose applications are rejected.

Wyoming, the pioneer State in providing for the public supervision of the acquirement of rights, gives the engineer authority to reject applications which are contrary to public policy. This has been followed by most of the States which have adopted codes in recent years. This provision is so general in its terms that it may be interpreted to mean much or little. In Wyoming charges of favoritism were made against the engineer, and the exercise of this authority has given him a great deal of trouble. The engineer of Nevada holds that this provision gives him no authority to reject applications which conform to the general rules of the office. The Utah engineer held that this provision gave him authority to choose between possible uses and refused an application for a use which in his opinion was not the best possible use of the water. Appeal was taken to the courts, the engineer was overruled in this matter, and at the next session of the legislature the law was repealed. In the other States which have adopted this provision the law is not yet effective. It appears, therefore, that this law is either ineffective or unpopular with both the engineers and the public. It seems very doubtful whether such discretion or such a burden should be put upon an officer, as it leaves room for charges of discrimination and appeals to the courts. It seems to be better to leave to the legislature the determination of what is good public policy, making the engineer a strictly administrative officer, who is to see that these principles are enforced.

Rights may be transferred in all of the States with the possible exception of Nebraska. In order that the list of rights may at all times be correct, it is necessary that these transfers be recorded with the State engineer. Correctness and accuracy require nothing more than this. It is, however, a fundamental part of the law of transfers that they can be made only when the rights of others are not injured. Originally there was no provision for determining in advance of the transfer whether the rights of others would be injured thereby. The usual procedure was to make the transfer, after which those claiming to be injured were compelled to bring action to prevent it. This placed the burden of determining whether a transfer might be made upon those who might be injured rather than upon those who are to receive the benefit. Recognizing this, Colorado requires that the party wishing to make a transfer apply to the court having jurisdiction of the stream, and the transfer is allowed only after a hearing similar to that held in connection with defining rights. Idaho, Nevada, North and South Dakota, and Oklahoma require that application must be made to the State engineer, who is to hold hearings, after a proper advertisement, and determine in advance whether a proposed transfer can be made without injury to other rights. Wyoming gives the engineer authority to recognize a transfer or refuse to do so, after which either party may appeal to the court. Since the question whether the transfer of a right will injure others is entirely one of physical facts and does not involve any legal questions, it seems that this matter is more properly left with the State engineer, who is a hydraulic engineer, than with the courts. The essential requirements regarding transfers are that there shall be a record and that it shall be determined in advance whether the rights of others will be injured.

Having a complete list of all rights to water, the officer charged with its distribution needs also a knowledge of the supply with which to satisfy these rights, and all the States having engineers provide for the making of stream gaugings. It is also essential that he have means of measuring accurately the quantity of water delivered, and means of controlling this. Most of the States have provided for this by requiring ditch owners to put in head gates and measuring devices on the request of the water officials. Various means of enforcing this provision, in case the owners refuse to put in the structures, have been tried, such as having the official put them in and collect the cost through the county commissioners or by suit in the court, or having the county commissioners put in the structures and tax the cost against the property of the ditch owner. All such systems have proved ineffective, partly because county commissioners are apt to be in sympathy with the ditch owners and refuse to act, and partly because of the delay which is unavoidable where so many different agencies are required to act. The only provision which has

been uniformly effective is giving the water officials power to refuse to deliver water to parties who do not comply with their orders within a reasonable time.

While the systems of distribution in the various States having public officials for this purpose differ in detail, they are in general the same. The essential thing is that the districts be as nearly independent as possible, and that all rights which are in any way interdependent come within the jurisdiction of a single official. Colorado was the first State to provide for this, and its system is still the model. The State is divided into divisions formed on drainage lines, each of which is entirely independent, putting each stream system under the control of a single division engineer. These are subdivided into districts which are also formed on drainage lines, but are not entirely independent. Each of these districts is served by a commissioner, who is under the general direction of the division engineer. The methods of meeting the cost of distribution differ widely. In some States it is paid by the counties and in others assessed against those using the water. This does not seem to be a matter of great importance. It may very properly be assessed against the users of the water, since they are the principal beneficiaries of the work, or it may be paid by the county as a sort of bonus to the industry, justified on the ground of the great public benefit derived.

TABULAR SUMMARY.

Public control of water, 1905.

State or Territory.	Defining of rights.	Acquirement of rights.		Distribution.
		Initiation.	Proof of completion.	
Arizona.....	No provision.....	Post and file notice.	No provision.....	No provision.
California.....	do.....	do.....	do.....	Do.
Colorado.....	Courts, on application of interested party.	do.....	do.....	Public officials.
Idaho.....	Courts—surveys by State engineer when ordered by court.	Application for permit.	Inspection by State engineer.	Do.
Kansas.....	Courts.....	Post and file notice.	No provision.....	Court officers.
Montana.....	Courts—all claimants parties; no surveys.	do.....	File maps.....	Do.
Nebraska.....	Administrative — secretary, board of irrigation.	Application for permit.	Sworn statement and inspection.	Public officials.
Nevada.....	Administrative—State engineer.	do.....	Rules not made...	Do.
New Mexico	Administrative—board of control.	File notice.....	No provision.....	No provision.
North Dakota.....	Courts—surveys by State engineer.	Application for permit.	Inspection by State engineer.	Public officials.
Oklahoma.....	Courts—surveys by Territorial engineer.	do.....	Inspection by Territorial engineer.	Do.
Oregon	Courts—surveys by State engineer when ordered by court.	Post and file claim.	No provision.....	No provision.
South Dakota.....	Courts—surveys by State engineer.	Application for permit.	Inspection by State engineer.	Public officials.
Utah.....	do.....	do.....	Sworn statements	Do.
Texas.....	No provision.....	File notice.....	No provision.....	No provision.
Washington.....	Courts—on application of any interested party.	Post and file notice.	do.....	Public officials.
Wyoming.....	Administrative—board of control.	Application for permit.	Inspection by superintendent.	Do.

Irrigation officials in the arid States, 1905.

Officials.	Appointed by—	Term.	Salary.	Paid by—
Colorado:				
State engineer.....	Governor.....	2 years.....	\$3,000 per year.....	State.
Division engineers.....	do.....	do.....	\$125 per month.....	Do.
Water commissioners.....	do.....	Not fixed.....	\$5 per day.....	Counties.
Idaho:				
State engineer.....	do.....	4 years.....	\$2,000 per year.....	State.
Water commissioners.....	do.....	6 years.....	\$10 per day.....	State and counties.
Water masters.....	Water commissioners.	1 year.....	\$4 per day.....	Users.
Kansas: Water bailiffs.....	Courts.....	Not fixed.....	\$2 per day.....	Counties.
Montana:				
State engineer.....	Governor.....	4 years.....	\$2,500 per year.....	State.
Water commissioners.....	Courts.....	Indeterminate.....	Not fixed.....	Users.
Nebraska:				
Secretary State board....	State board.....	2 years.....	\$2,000 per year.....	State.
Under secretaries.....	do.....	do.....	\$5 per day.....	Do.
Under assistants.....	do.....	do.....	do.....	Counties.
Nevada:				
State engineer.....	Governor.....	Not fixed.....	\$2,400 per year.....	State.
Water commissioners.....	State board.....	do.....	Not fixed.....	Counties.
North Dakota:				
State engineer.....	Governor.....	4 years.....	\$2,500 per year.....	State.
Water commissioners.....	do.....	6 years.....	\$10 per day.....	Do.
Water masters.....	Water commissioners.	Indeterminate.....	\$4 per day.....	Users.
Oklahoma:				
Territorial engineer ^a				
Water masters.....	Territorial engineer.....		\$3 per day.....	Users.
Oregon: State engineer.....	Governor.....	4 years.....	\$2,400 per year.....	State.
South Dakota:				
State engineer.....	do.....	6 years.....	\$2,000 per year.....	Do.
Water commissioners.....	do.....	do.....	\$5 per day.....	Do.
Utah:				
State engineer.....	do.....	4 years.....	\$3,000 per year.....	Do.
Superintendents.....	State engineer.....	Indeterminate.....	Fixed by engineer.	Do.
Supervisors.....	County commissioners.....	do.....	\$3 per day.....	Counties.
Washington: Water commissioners.	do.....	1 year.....	Not fixed.....	Do.
Wyoming:				
State engineer.....	Governor.....	6 years.....	\$2,500 per year.....	State.
Superintendents.....	do.....	4 years.....	\$1,200 per year.....	Do.
Water commissioners.....	do.....	2 years.....	\$5 per day.....	Counties.
Secretary board of control.....	Board of control.....	Indeterminate.....	\$1,200 per year.....	State.

^aDuties prescribed but no provision for appointment.



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